The Dissertation Committee for Paula Holland Price Certifies that this is the approved version of the following dissertation:

Perceived and Measured Environmental Barriers to Physical Activity Among Minority Youth in East Austin

Committee:

John B. Bartholomew, Supervisor

Esbelle M. Jowers

Marlene A. Dixon

Nancy L. Hazen-Swann

Kelly P. Gaither

Perceived and Measured Environmental Barriers to Physical Activity Among Minority Youth in East Austin

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Paula Holland Price, B.S.; M.S.H.E.;M.D.

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Dedication

I dedicate this work to my advisor and mentor, John B. Bartholomew.

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Perceived and Measured Environmental Barriers to Physical Activity Among Minority Youth in East Austin

Paula Holland Price, Ph.D.

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Supervisor: John B. Bartholomew

Two prospective studies were conducted to examine the social and built environmental barriers to physical activity among middle childhood youth in a low income, minority, urban community. The mixed method design first explored parent and child perceptions related to the social and built environmental barriers to middle childhood, ages 8-12, physical activity (PA) for families residing in East Austin, and then compared those to barriers identified by a systematic objective assessment of the neighborhoods of residence. Study 1 was a qualitative study where middle childhood-aged students and their parents participated in six parent-only and student-only focus groups. The focus group prompts encouraged discussion of the participants' perceptions of built and social environmental barriers to PA within their community. The parents identified traffic, crime, limited programming at local PA sites and technology, such as video games and television, as barriers to middle childhood PA. While the students discussed traffic and crime, they expressed less concern than their parents, and although they acknowledged that television and video games competed with PA, they expressed a desire for more family PA. Study 2 was an environmental study incorporating spatial analysis and systematic objective observation. Five East Austin neighborhoods were selected from those represented by the Study 1 participants. The neighborhoods and

nearby recreational sites were mapped. Built environmental barriers were located and crime and traffic data were incorporated for each specific neighborhood. The measured barriers were then compared to the perceived barriers from Study 1. The spatial analysis revealed that the youth of East Austin have access to many parks and PA sites. Built environmental barriers included railroad tracks; traffic danger and fenced commercial properties blocking access. Social environmental barriers included limited age-appropriate programming for middle childhood-aged youth.

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CHAPTER 1: INTRODUCTION

Purpose

The purpose of this study was to explore parent- and child-perceived social and environmental barriers to physical activity for children in middle-childhood (ages 8 to 12) residing in a lower socioeconomic (SES), urban community and to compare those perceptions to barriers identified by a systematic objective assessment of the neighborhoods of residence. Parent and child perceptions regarding barriers to childhood physical activity (PA) in their neighborhoods of residence and within the community were compared to each other and to those identified by objective assessments, utilizing systematic observation and spatial data analysis.

Significance of the Study

This dissertation was designed to extend current knowledge regarding the concordance between environmental barriers to PA for middle childhood youth residing in a low income, urban community as perceived by parents and their children and those identified by objective measures. While it appears clear that the environment is a strong determinant of PA behavior, it is unclear how the built and social environment and parental/child perceptions of the environment moderate PA behavior decisions in middle childhood. Likewise, the concordance of their perceptions with each other and objective measures is poorly understood.

This will be the first study to examine the individual perceptions of minority parent/child dyads residing in a lower SES community concerning social and built environmental barriers to PA among middle-childhood youth and to compare those perceptions to each other and to objective measures. The exploratory nature of this mixed methods study allows a more complete understanding of the complex nature of the

environmental influences within the home, school and community upon PA in middle childhood. These data inform the development of educational interventions for parents, children and educators and the modification of environmental and public policy to improve the health and quality of life throughout many life stages.

Background

The continued rise in the prevalence of childhood overweight/obesity and the associated detriment to length and quality of life demonstrate the need for scientific exploration to better understand its etiology and inform the development of effective prevention (Ogden et al., 2006). Adult perceptions of barriers to PA are well documented, as are objective assessments of environmental features, particularly those that serve as barriers to adult PA within the community of residence and place of employment (Parks, Houseman & Brownson, 2003). Fewer studies have explored the environmental barriers to PA behavior in the adolescent years (Kligerman et al., 2007). Even fewer have assessed barriers to PA in middle childhood and most of these have relied upon parental reports. And, while some systematic objective assessments of park usage have included children, most have defined "children" quite broadly and grouped participants from 2-19 years of age. This fails to acknowledge the wide variability in physical and emotional development, needs and perceptions of children as they age (McKenzie & Cohen, 2006).

Additionally, while published studies have reported discordance between perceived and objectively measured environmental barriers to adult PA behaviors, few have compared adolescent perceptions to objective measures. Very few have explored the potential discordance between perceived and objectively measured barriers in middle childhood. Likewise, the semblance of parent and child perceptions of environmental factors impacting childhood PA has not been adequately investigated and none have

compared the perceptions of parent/child dyads with objective assessments. Yet youth and parent perceptions seem equally important in understanding barriers to PA at a time when the child is beginning to interact independently with the environment.

Finally, few studies have systematically explored the environmental characteristics that support or hinder PA behavior in middle childhood; and fewer still have done so by objective assessment of the actual usage of PA facilities by youth in middle childhood. Social and built environmental factors are suspected to moderate PA behaviors and promote the continued rise and increasing disparity in prevalence of overweight/obesity. These factors have been examined in adult populations but cannot be assumed to moderate the PA behaviors of developing children in the same way (Reis et al., 2004). Likewise, the changing environmental needs and slowly emerging autonomy of middle childhood are unique to that developmental stage and are unlike those of early childhood and adolescence. Yet, the influence of child and parent perceptions upon PA behaviors of middle childhood youth remain poorly understood, as does the concordance of these perceptions with objectively assessed social and built environmental barriers to PA. This dissertation is designed as an initial effort to fill this void.

Method

STUDY 1

Study 1 was a qualitative exploration of the views expressed by minority parents and their children concerning the social and built environmental barriers to PA among middle childhood youth in the minority, lower SES community. Parents and children attended separate, simultaneously scheduled focus groups at the child's school. Parent focus groups and student focus groups were held on three different dates.

The analysis of written transcripts included the identification, organization and

analysis of dominant themes of discussion, including expected themes generated from literature review and additional emergent themes that arose in the discussion. Personal histories, stories and quotations were organized and cultivated in support of the dominant themes.

STUDY 2

Study 2 included a spatial analysis of the neighborhoods surrounding the residences of five Study 1 participants, examining built environmental factors suspected to moderate PA of middle childhood youth. The analysis included an assessment of proximity of the residential block to potential PA sites within one-half mile, barriers to walking and cycling to potential PA sites, and a visual analysis of neighborhood Geographic Information System (GIS) data related to traffic danger and crime.

Study 2 also included the systematic, objective observational analysis of potential PA sites. These were drawn from both the immediate area of the five residences noted above, as well as additional locations that are identified by the Study 1 participants as appropriate sites for middle childhood aged-students to engage in PA. The System for Observing Play and Recreation in Communities (SOPARC) was the instrument chosen for recording the observations.

Research Questions and Hypotheses

STUDY 1

Research Questions

Research question 1.1: How do parents perceive built and social environmental barriers to their middle childhood-aged youth PA within the East Austin community?

Research question 1.2: How do youth perceive built and social environmental barriers to middle childhood PA within the East Austin community?

Research question 1.3: How will the parent perceptions compare to the youth perceptions of built and social environmental barriers to middle childhood PA within the east Austin community?

STUDY 2

Hypotheses

Hypothesis 2.1: There will be discordance between the objective assessment of environmental barriers to middle childhood youth PA and the perceived environmental barriers reported by the focus group parents.

Hypothesis 2.2: There will be concordance between the objective assessment of environmental barriers to middle childhood youth PA and the perceived environmental barriers reported by the focus group youth.

Hypothesis 2.3: The spatial analysis will identify insufficient access to recreational sites appropriate for middle childhood youth PA within the one-half mile radius of the selected homes of residence.

Hypothesis 2.4: The systematic objective observational data will demonstrate that:

- the majority of recreational site programming is planned for adult participants
- the majority of PA facility users are not middle childhood youth
- the majority of community school facilities are not available for unorganized play after school

Limitations

STUDY 1

Enrolled third, fourth and fifth grade students from the targeted charter school in central East Austin and their parents were invited to participate in the focus group discussions of Study 1. As the data collection occurred in collective focus groups, it could

not be differentially applied to each specific location in Study 2. The self-selection of subjects may have resulted in a biased sample, with over-representation of parents who are more involved in the school and community. This is not expected to alter the validity of the results, as the more interested parent likely offered a thoughtful assessment of the barriers to youth PA.

The ethnographic analysis created the potential for researcher bias. To lessen the impact of any bias, focus groups were audio recorded and professionally transcribed. Additionally, a "real time" written record of the focus groups was created by a scribe during the focus group. Careful attention was made to the trustworthiness of the recorded data and participants had the opportunity to correct the written record as it was created on poster-sized sheets positioned next to the focus group leader and posted to the walls of the room. The transcription was reviewed for accuracy. Expected themes were selected, based upon the literature review. At the time of analysis, the original transcripts were line coded and additional dominant themes of discussion were selected as they emerged. When the final list of themes was selected, the transcripts were coded for the analysis, and the quotations and stories were thematically organized for the final analysis. The exploratory nature of this qualitative inquiry cannot support an inference of causality. It is, instead, intended as a preliminary excavation of the many factors that may contribute to a complex question.

STUDY 2

The use of investigator observation may allow for researcher bias in the recording and interpretation of observational data. To lessen this risk, the SOPARC tool, as revised by Bocarro (2009), was utilized to standardize the observational coding. The SOPARC protocol includes thorough training for the investigator to develop standardized

procedures and has been validated for use in all age populations and a variety of recreational facilities.

The PA sites chosen for observation were selected to allow for the mapping and analysis of a variety of neighborhoods; therefore, the selection was not random and is subject to potential site selection bias. This is not expected to compromise the validity of results, but rather to ensure the largest possible coverage of the targeted community. The spatial analysis and geographic information systems are relatively new methods of investigating and displaying data that are drawn from the Austin Police Department and City of Austin GIS database. The GIS data sources were not developed by, nor are they under the control of the researcher. She is not responsible for their reliability.

Delimitations

The targeted population of both studies was low income, minority middle childhood youth and their parents. This allowed for a focused study of a complex question impacting a specific population and environment. Thus, both studies were delimited to minority middle childhood youth and their parents residing in a lower SES community. The results may not be generalizable to a wider population.

Definitions of Terms

The key terms of interest are defined in this section.

Acathosis Nigricans- a skin discoloration of the neck and axillae, which may predict an increased risk of glucose intolerance.

Adolescence- a broad category of development generally accepted to include children ages twelve to eighteen

Built environment – the human-made surroundings and infrastructure in which populations exist.

Carotid intima-media thickness (CIMT) - measurement of the luminal and muscular layers of the posterior wall of the common carotid artery which is a measure of early CVD

Childhood Obesity - Body Mass Index (BMI=weight/height ^{2}) at or above the 95th percentile for gender and age in children 2 to 19 years of age.

Childhood Overweight - BMI equal to or greater than the 85th percentile, but less than the 95th percentile, for gender and age.

Data visualization - the visual representation of quantitative data.

Early childhood - a broad category of development defined by the Healthy People 2020 initiative to include children from birth to six years of age.

Ethnographic analysis – a qualitative research method for the study of a group or culture by examining the individual participant's lived experience utilizing observational and directed individual or group interview techniques.

G*eographic Information System (GIS)* - the hardware, software and data used for capturing, managing, analyzing, and displaying geographically-referenced information.

Middle childhood - a broad category of development defined by the Healthy People 2020 initiative to include children from six to twelve years of age.

Social environment - the socio-cultural context in which one lives, including formal and informal networks of relationship, culture, education, income, and work.

Spatial data analysis - the analysis and depiction of the arrangement and importance of quantitative data by location and spatial arrangement.

Systematic observation - the collection of data through a reliable procedural observation of behavior.

CHAPTER 2: REVIEW OF THE LITERATURE

This chapter will review the current body of knowledge regarding PA as a means to prevent obesity and obesity-related disease. It will progress through an overview of obesity and obesity-related disease to a review of the benefits of PA. It will then focus on environmental contributors to PA. Each section will begin with a brief overview before delving into the data. Specific note will be made of SES as a contributor to these issues. Finally, because childhood data are scarce – particularly for middle childhood youth – each section will begin with a discussion of adult data. I will then draw connections, where possible, to the child data in general, and the data related specifically to middle childhood youth, where it exists.

Obesity

CHILDHOOD OBESITY DEFINED

O*besity* in childhood is defined by the Centers for Disease Control and Prevention (CDC) and the American Academy of Pediatrics (AAP) by a Body Mass Index (BMI=weight/height ^{2}) at or above the 95th percentile for gender and age in children 2 to 19 years of age (Krebs et al., 2007). Likewise, for the same age group, o*verweight* is defined by a calculated BMI equal to or greater than the 85th percentile, but less than the 95th percentile, for gender and age. A third category, *severe* or *morbid obesity*, describes the group at greatest risk and is defined by a calculated BMI at or above the 99th percentile for gender and age (Freedman, Mei, Srinivasan, Berenson & Dietz, 2007). The CDC BMI-for-age growth charts published in 2000 further define the BMI category cutoffs for children aged 2 to 17 years by gender and age.

U. S. CHILDHOOD OBESITY PREVALENCE

The prevalence of childhood obesity in the United States has continued to rise for

more than three decades (Ogden et al., 2006). Fourteen years ago, the World Health Organization (WHO) first warned the world of a growing "global obesity epidemic" and published its recommendations for the prevention and management of obesity (World Health Organization, 1998). At that time, the prevalence of obesity among children in the United States (US) was estimated at 15%, having tripled from 5% twenty years prior (US Department of Health and Human Services, 2008). More recent findings from the 2007-2008 National Health and Nutrition Examination Survey (NHANES) revealed that approximately 17-19 % of American children met the definition of *obesity* and more than one third were overweight (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010). Hoelscher and colleagues (2004) examined data from a large sample of fourth, eighth and eleventh grade students in Texas and reported a 22.4%, 19.2%, and 15.5%, respectively, prevalence of overweight.

The prevalence of childhood obesity has increased across racial and ethnic groups (Strauss & Pollack, 2001). However, the rate of increase has not been constant and now varies significantly between ethnic populations and socioeconomic groups. This disparity has continued to widen (Madsen, Weedn & Crawford, 2010; Miech, Kumanyika, Stettler, Link, Phelan & Chang, 2006) and is now recognized to vary by gender, ethnicity and community of residence (Singh, Kogan, Siahpush & vanDyck, 2008). The prevalence of overweight/obesity is lower in Asian children but higher among Mexican-American and African American children than white children (Freedman, Khan, Serdula, Ogden, & Dietz, 2006). Data from the 2007-2008 NHANES demonstrated that the largest obesity rates were reported among Hispanic boys and non-Hispanic African-American girls. Both of which nearly doubled over the previous fifteen years. Obesity prevalence was lowest among non-Hispanic Caucasian boys and girls (Ogden et al., 2010). Hoelscher and

colleagues (2004) found similar ethnic disparity in the overweight prevalence of students in Texas: the highest prevalence was found among Hispanic boys, fourth-grade Hispanic girls, and fourth- and eighth-grade African American girls, while the lowest prevalence was found among eleventh-grade White/Other girls. In light of recent evidence demonstrating that body fatness varies by race/ethnicity, as does the association between BMI and body fatness, these ethnic disparities based upon BMI calculations may be even larger than originally reported. Freedman and colleagues (2008) completed body composition assessments in 1,104 healthy 5 to 18 year old children and reported that at similar BMI-for-age categories, body fatness differed between ethnic groups by as much as five percent.

Furthermore, it appears that the disparate increases in overweight/obesity prevalence rates of minority populations may be reflective of the many factors related to an increased risk from living in poverty. Goodman (1999) looked at five categories of income and education from the Add Health study and found an inverse relationship between household income, defined by educational attainment of the parent, and obesity in adolescents. This association remained independent despite corrections for other socio-demographic factors such as race and parental presence. Gordon-Larsen, Adair and Popkin (2003) examined the association between family income and ethnicity and found these two factors co-varied in their association with overweight in children.

Additional studies have implicated income disparity as a specific and consistent variable in association with childhood overweight/obesity, disproportionately impacting families living below the poverty line. Wang (2001) examined the relationship between obesity and socioeconomic status (SES) in the US, using family income as the primary indicator of SES, and found that low SES groups had a higher rate of obesity.

Furthermore, analyzing data from the Centers for Disease Control and National Center for Health Statistics' National Survey of Children's Health, 2003 (NSCH), BeLue, Francis, Rollins and Colaco (2009) reported that only sex and income predicted overweight for male children living below the ~300% poverty line and concluded that poverty played a major role in the development of obesity.

However, while acknowledging the primary role of economic disadvantage, the causes of childhood obesity appear multi-factorial in nature (Gordon-Larsen, Adair & Popkin, 2003). Gordon-Larsen and colleagues found that statistical corrections for income and education failed to equalize the differences between ethnic groups. Therefore, the economic and ethnic factors contributing to the disparity of childhood overweight/obesity prevalence rates likely occur through a number of biological, psychological and social mediators and moderators, including factors related to the child's environment. Singh, Siahpush and Kogan (2010) analyzed data from over forty thousand children, aged ten through seventeen years of age, obtained from the 2003 and 2007 National Survey of Children's Health. They reported that the disparity in obesity rates had widened between 2003 and 2007, largely due to greater increases in prevalence among Hispanic children and families of single female parents. Household income, education and employment were found to contribute to the 3.4 to 4.3 times greater odds of obesity among children of lower SES families. The disparity in childhood overweight/obesity prevalence by ethnicity has been interpreted as evidence of social and environmental influences which are poorly understood (Daniels et al., 2005). These SES and cultural differences influence both obesity and PA. Therefore, the economic disadvantage experienced by lower SES families is likely to present in the environment in which they live, as barriers to health: fast food abundance, fresh fruit and vegetable

deserts, limited green space for play, and little expendable income for sports participation.

THE SEQUELAE OF CHILDHOOD OBESITY

Childhood obesity remains a major public health concern in the United States (Koplan, Liverman, & Kraak, 2005) and around the world. This concern has continued to increase with the growing list of associated morbidity and mortality correlates in childhood and adulthood predicted by unhealthy weight gain in childhood. Obesity in childhood has been found to correlate with chronic physical and psychological disorders including metabolic disorders such as Type 2 diabetes and metabolic syndrome; cardiovascular disease (CVD), often as a result of hypertension, dyslipidemia, atherosclerosis and glucose intolerance; respiratory disease including asthma or obstructive sleep apnea; orthopedic disorders including slipped capital femoral epiphysis and/or neurological and mental health problems including depression, anxiety, low self-esteem and impaired learning (Bell, Rogers, Dietz, Ogden, Schuler, & Popovic, 2011; Freedman et al., 2007). These adverse outcomes have prompted several states to mandate BMI screening of all school children. Texas, where the adult obesity prevalence exceeds 30% (CDC, 2011), is one such state, screening for childhood obesity and the presence of acathosis nigricans, a skin discoloration of the neck and axillae, which may predict increased risk of glucose intolerance.

Metabolic syndrome is not a specific disease diagnosis, but is instead a constellation of clinical and laboratory findings. In children, the syndrome includes insulin resistance, elevated triglycerides and hypertension and is a suspected consequence of excess weight gain and decreased PA. The prevalence of metabolic syndrome among children approaches 50% among overweight children, with even small increases in BMI

increasing the risk of metabolic syndrome by 50% in childhood (Weiss et al., 2004). This prevalence is higher than in adolescent and adult populations. Potential consequences of metabolic syndrome include subsequent liver and renal dysfunction, as well as CVD.

Type 2 Diabetes, once a disease confined to middle-age, is no longer an uncommon diagnosis among overweight children (Fagot-Campagna, 2000; Wiegand, Dannemann, Krude, & Gruters, 2005). The prevalence of Type 2 Diabetes in childhood increased in close association with the obesity epidemic and now far surpasses the prevalence of insulin-dependent juvenile diabetes in adolescents (Pinhas-Hamiel et al., 1996). This increased prevalence among youth has prompted concern in light of strong evidence that diabetes greatly increases the risk of CVD in adulthood.

The CVD risk to overweight children and adolescents is less clear, as is the predictability of CVD risk as overweight children enter adulthood, but evidence of increased risk is emerging (Freedman et al., 2007; Urbina et al., 2009). Anatomical evidence of CVD has been demonstrated in children and adolescents as atherosclerotic lesions in gross section and carotid intima-media thickening by sonogram (Freedman et al., 2007; Urbina et al., 2009; Zieske, Malcom, & Strong, 2002). Aortic fatty streaks have been found in children as young as three years of age (McGill, 1988) with the advancement of the atherosclerotic process closely linked to unhealthy weight gain in children (Fagot-Campagna, 2000; Strauss & Pollack, 2001). Atherosclerotic lesions were found associated with dyslipidemia, hypertension, BMI and tobacco use in The Bogalusa Heart Study and dyslipidemia, hypertension, tobacco use (Freedman et al., 2007) and diabetes in the Pathobiological Determinants of Atherosclerosis in Youth study (PDAY) (Zieske, et al., 2002). Increases in carotid intima-medial thickness (CIMT) measurements, indicative of early CVD, have been found in children with metabolic

syndrome, diabetes and hypertension, as well as obesity (Lande, Carson, Roy & Meagher, 2006; Meyer, Kundt, Steiner, Schuff-Werner & Kienast, 2006; Woo et al., 2004;).

In summary, excess weight gain in childhood has been demonstrated to negatively impact the health of children. While the prevalence continues to rise, there is evidence of an increasing disparity by ethnicity and SES. The burden of disease is shifting to minority and lower SES youth, and it is here where our preventive efforts will be best directed.

CHILDHOOD OBESITY AS A PREDICTOR OF ADULT OBESITY AND DISEASE

Childhood obesity tends to continue into adulthood where it is associated with increased risk of disease and death, primarily associated with CVD, diabetes and some cancers. Herman, Craig, Gauvin & Katmarxyz (2009) examined BMI data from 374 participants of the 1981 Canada Fitness Survey as children (ages 7-18 years) and again 22 years later and reported a moderate to strong correlation between youth and adult BMI among female participants and a moderate correlation in male participants. They reported that 83% of those with unhealthy weight gain in childhood remained overweight, as adults while the great majority of healthy weight adults were also healthy weight youth. Yet, healthy weight youth remain at risk of overweight in adulthood, as 85% of the overweight adult participants had not been overweight in childhood. Evidence of the predictive value of childhood obesity as a predictor of future adult obesity and CVD continues to strengthen (Guo, Roche, Chumlea, Gardner, & Siervogel, 1994; Tirosh et al., 2011). Even small increases in fatness in middle childhood and adolescence are reported to predict subsequent adult CVD and premature death (Baker, Olsen, & Sorensen, 2007).

The cost of excess fatness is paid in loss of human life and reduced quality of life,

as well as financially. Cardiovascular disease was reported as the leading cause of death in the United States in 2008 (CDC, 2011). Two additional top ten causes are highly linked to excess fatness: malignancy and diabetes. Given these risks and the increasing prevalence of overweight and obesity in childhood, there is concern that the current generation of children will be the first to fail to out-perform their parents in quality of life, health and longevity (Olshansky, 2005). There is also a large, financial cost. Obesity-related medical care in the United States is estimated to cost $150 billion, annually (Finkelstein, Trogdon, Cohen & Dietz, 2009). This represents 10% of the annual U.S. expenditure for health care and has increased two fold within the last ten years. In addition, in its effort to stem the rising cost of obesity, The National Institutes of Health (NIH) spent $971 million on obesity prevention and treatment research in 2010 alone (NIH, 2010).

PREVENTION OF OBESITY-RELATED DISEASE

It is widely understood that obesity is unhealthy and, yet, the prevalence among children and adults continues to rise. Public health and clinical interventions have demonstrated limited success in effecting sustained weight loss and improved health status (Chan & Woo, 2010; Flodmark, Ohlsson, Ryden, & Sveger, 1993; Jeffery et al., 2000). Weight loss has proven to be challenging and treatment utilizing both dietary and PA modifications have failed to demonstrate long-term effectiveness in obese subjects. Additionally, there is little evidence that the widely available treatments for obesity have effectively abated the destructive sequelae of excess weight gain, namely, the prevalence of CVD (Chan & Woo, 2010).

Given these data, efforts to prevent, rather than treat, must occur long before adulthood or even adolescence and long before the obesity diagnosis (Fagot-Campagna,

2000; Strauss & Pollack, 2001). Even small increases in fatness in middle childhood are predictive of subsequent CVD and premature death (Baker, Olsen, & Sorensen, 2007; Schaefer, Georgi, Wuhl & Scharer, 1999). While both nutrition and PA are critical components of obesity prevention, a comprehensive examination of both is beyond the scope of this dissertation. Its focus will, instead, be limited to PA, particularly environmental barriers to PA. Efforts to increase PA and fitness appear to offer promise as potential obesity prevention strategies (WHO, 2000; Williams and Wood, 2006). Physical activity has also been reported to decrease the risk of obesity-related disease and mortality irrespective of weight loss (Xuemei et al., 2007). In addition, environmental factors have emerged as clear moderators of PA and are strongly associated with SES (Parks, Houseman & Brownson, 2003). The remainder of this review will center on these issues.

Physical Activity

PHYSICAL ACTIVITY DEFINED

Physical activity (PA) is defined, in its simplest form, as body movement caused by skeletal muscle contractions (USDHHS, 2008). More complete kinetic definitions would add that PA requires the expenditure of energy beyond that required for physiologic demand in a resting state. For the purposes of this dissertation, PA is defined as movement that produces a health benefit, which typically refers to movement of large muscle groups with considerable and measureable energy expenditure (Brown, Heath, & Martin, 2009).

The Physical Activity Guidelines Advisory Committee (2008) recommended that adults avoid inactivity and "engage in at least 150 minutes a week of moderate-intensity aerobic PA or 75 minutes a week of vigorous-intensity aerobic activity or an equivalent

combination". The committee also recommended muscle-strengthening activity twice a week and 150 additional minutes of aerobic PA for additional health benefits. The current PA recommendation for American children is sixty minutes or more of moderate to vigorous activity daily, with vigorous-intensity activity at least three times per week. Muscle-strengthening PA and bone-strengthening PA is recommended for children at least 3 times per week as part of the 60 minutes of daily PA (USDHHS, 2008).

Physical fitness is a term used to describe the physiologic capacity of the body as it is impacted by PA. It is often considered to include muscle strength and endurance, aerobic fitness, muscular flexibility and body composition. *Aerobic fitness* refers to the cardiorespiratory system's maximal capacity to use oxygen in the performance of PA and is a recognized measure of cardiovascular health.

HEALTH BENEFITS OF PHYSICAL ACTIVITY IN ADULTS

The health benefits of PA in adults appear to correlate with the type, frequency, duration and intensity of activity. PA has been demonstrated to assist in the maintenance of healthy weight in adults, strengthen bones and muscles, offer some protection in the prevention of CVD and stabilize emotion and mood. Additionally, PA appears to play a role in the prevention of some cancers.

The World Health Organization has identified PA as an effective strategy in the battle against obesity (WHO, 2000) and the prevention of associated sequelae. Regular PA helps to reduce the risk of becoming obese (Williams & Wood, 2006) and aids in weight loss as the energy expenditure from PA impacts net energy balance, the primary determinant of weight. Importantly, even in the absence of weight loss, PA is reported to decrease the risk of all-cause mortality associated with overweight/obesity (Xuemei et al., 2007).

Cardiovascular disease is the most common cause of death in the U.S. (CDC, 2011) and regular PA appears to effectively reduce this risk. Numerous studies have demonstrated the dose-response effect of PA upon CVD risk (Morris, 1953; Myers et al., 2002; Paffenbarger, Hyde, Wing, & Hsieh, 1986). Likewise, in the same way that PA helps to reduce CVD risk by affecting blood pressure and arterial health, PA reduces the risk of thromboembolic stroke as adults age (Manson et al., 2002). While all forms of PA are of some benefit, aerobic PA has been most strongly correlated with a reduction in CVD and premature death risk (Myers et al., 2002).

Additionally, the risk of some cancers is reportedly reduced by regular PA, specifically colon cancer and breast cancer. However, the mechanism of protection is poorly understood (Friedenreich & Cust, 2008). Post-menopausal breast cancer risk may be reduced by changes in circulating sex hormone, a reduction in chronic inflammation or metabolic shifts in response to PA or reduced adiposity. The reduction in colon cancer is suspected to be due to a decreased lower intestinal transit time, decreasing gut exposure to ingested carcinogens (Lee & Oguma, 2006).

There is evidence that regular PA improves mood, self-esteem and perception of health. Depressive and anxiety symptoms are reported to improve with regular PA in adults (Dishman, Washburn, & Heath, 2004). These benefits appear to be independent of weight status as physically active overweight/obese adults reported a higher health-related quality of life (HRQOL) than physically inactive adults of all weight groups (Heath & Brown, 2009). Other adult studies have reported improved sleep (Tworoger et al., 2003), psychological well-being (McAuley et al., 2006) and cognition (Weuve et al., 2004) with regular PA.

THE HEALTH BENEFITS OF PHYSICAL ACTIVITY IN CHILDREN

The reported health benefits of PA to children are similar, but not identical to those reported in adults. Firstly, the preponderance of published data investigating the health benefits of PA has examined its effect in adult subjects. Secondly, until recently, much of the PA research in children chronicled normal growth and development through childhood and adolescence, rather than the pathological processes linked to excess weight gain. As the chronic diseases of adulthood have extended into childhood, along with an increased prevalence of obesity and decreased time spent in moderate to vigorous physical activity (MVPA), researchers have begun to examine both the benefit of PA and the consequences of reduced PA on child health.

From infancy, PA appears to be critical to the motor and neurological development of healthy children. The expected progression and value of unrestricted PA, primarily as various forms of PA play, to normal development have been studied for decades. Physical Activity health benefits to children have long been recognized to include social and psychological, as well as physical and neurological benefits (Pellegrini et al., 1993; Simons-Morton et al., 1990). Increased muscle strength, increased bone density and reduced CVD risk have more recently been identified as health benefits of childhood PA (Strong et al., 2005).

The role of PA in fostering neurological development has been reported to include cognitive development (Castelli, Hillman, Buck, & Erwin, 2007; Tomporowski & Ellis, 1986). Additionally, PA may assist in attention maintenance and inhibitory control (Chaddock et al., 2011). Physical activity has also been linked to academic achievement in children (Pelligrini & Smith, 1998). And, as in adults, PA has been demonstrated to effectively reduce depressive and anxiety symptoms and increase self-esteem (Strong et

al., 2005).

Clinical evidence of CVD has been reported to correlate with fitness and/or PA in childhood. Jago, Froberg, Cooper, Eiberg, and Andersen (2010) examined changes in cardiovascular risk associated with fitness in six and nine year old children and reported fitness was negatively associated with systolic blood pressure and total cholesterol. Physical activity was also found to positively associate with high density lipoprotein. In another study, the combination of low fitness and high fatness in children was reported to positively correlate with elevated C-reactive protein (CPR), a measure of inflammation, as did low PA and high fatness (Parrett et al., 2010).

Physical activity and fitness in childhood may not only lower cardiovascular risk in childhood, but also predict lower CVD risk in adulthood. Many of the same CVD and metabolic benefits of PA that are reported in adults have been reported in children and adolescents. The benefit of PA on CVD risk, as evidenced by hypertension, arterial stiffness and atherosclerosis as indicators of CVD, has been demonstrated in children, adolescents and young adults (Bellizzi & Dietz, 1998; Deckelbaum & Williams, 2001; Freedman, et al. 2001). In addition, there is growing evidence that these risks may be reversed by the initiation of PA among physically inactive youth. Likewise, vascular function, measured as flow-mediated dilation, has been demonstrated to herald the advent of atherosclerosis in adults, preceding both carotid intima-medial thickening and atherosclerotic streaking. Exercise training was found to improve vascular function, as well as increase muscle strength, decrease central adiposity and improve body composition in 19 obese adolescents who participated in an eight week circuit-training class (Watts et al., 2004). Interestingly, there was no significant change in participant weight, BMI or blood chemistry, including lipid profile, at the end of the eight weeks.

PATTERNS OF PA BEHAVIOR FROM CHILDHOOD TO ADULTHOOD

Despite clear PA recommendations for children and adults and Healthy People 2010 goals highlighting the need for regular PA, many Americans of all ages are physically inactive. More than one third of American youth do not meet minimal PA recommendations (USDHHS, 2010) and 24% of youth surveyed by the 2007 Youth Risk Behavior Surveillance System reported no PA in the previous week (CDC, 2010). Additionally, physical inactivity appears to consume a substantial portion of the day with 24% of youth reporting more than three hours of daily computer use and nearly one third reporting more than 3 hours of television viewing per day (CDC, 2010). Cross-sectional survey studies have demonstrated that PA participation has decreased for all-age children over the previous two decades. Physical activity also decreased, as youth grew older. Participation in daily school-based physical education, active transportation and sports participation decreased with age and by high school, only 17% of students reported sufficient PA to meet the definition of *physically active* (CDC, 2011). Thus, it is not surprising that American adults are also unlikely to meet current PA recommendations: less than 21% of adults reported meeting both aerobic and muscle-strengthening PA recommendations in 2010. Twenty-five percent reported no leisure-time PA. Additionally, adult PA was noted to decrease with age (CDC, 2011).

However, longitudinal studies have failed to consistently demonstrate that childhood PA predicts adult PA. Unlike BMI, PA does not appear to track well from childhood into adulthood (Herman, Craig, Gauvin & Katzmarzyk, 2009). Telama and colleagues (2005) examined data from 1563 participants in the Cardiovascular Risk in Young Finns Study and reported that childhood PA correlated with adult PA in highly active males only. In a similar study, Cleland, Dwyer and Venn (2011) reported that

childhood and adult PA of 2201 participants over a twenty year period were weakly correlated, although self-reported childhood sport participation better predicted adult PA. In summary, PA appears to be a critical health behavior assisting in the prevention of excess weight gain and providing some element of protection from the development of CVD and some cancers, irrespective of body mass. The health benefits of PA are evident throughout the life span, yet participation is poor and decreases with age from childhood, while the prevalence of related chronic disease increases. Understanding the factors that influence childhood PA behavior appears critical to the development of a healthful life trajectory.

Environmental Influences

OVERVIEW

Environmental influences are suspected to have played a significant role in the rising prevalence of obesity/overweight and obesity-related disease. The disparity in childhood overweight/obesity prevalence by ethnicity has been interpreted as evidence of these social and environmental influences. Because neighborhoods vary as a function of SES, the influence of SES and culture on PA may be environmentally mediated.

Activity-related behaviors, including both physical movement and time spent sedentary, and these behaviors have changed measurably over the last forty years as the social and built environments have evolved (Spence, Cutumisu, Edwards & Evans, 2008). Changes in the home (e.g. prevalence of television and computer ownership), school (e.g. patterns of transport and PE) and neighborhood (e.g. perceived safety) environments have changed dramatically over time to undermine PA. These changes have been implicated as contributing to an overall decrease in the average amount of time all-aged children spend in MVPA (Dunton et al., 2009). Not surprisingly, Millstein and

colleagues (2011) examined adolescent PA behaviors and potential environmental correlates and reported that home, school and neighborhood factors explained 15.8% of the variance in youth PA.

THE INFLUENCE OF PARENTS AND FAMILY

Parents serve as more than a source of genetic influence. The balance of genetic and social influences by parents on overweight/obesity and PA is poorly understood. However, it appears clear that the composite influence of the parents and family is strong, as having overweight/obese parents strongly predicts an overweight/obese child. Parents are the behavioral models in the home. In addition, parental education and family income largely determine the location and manner of residence (Goodman, 1999).

Parental influence has been examined in relation to physical inactivity and sedentary behaviors - particularly their role in the promotion of screen time. Time spent viewing television or computer screens is problematic in two ways. Not only is the activity sedentary, it competes with youth PA in the afterschool hours when children might be most active. Rideout, Roberts, and Foehr (2010) reported that most parents do not place or enforce television viewing time limits on their 8 to 18 year old children. Parents also reported providing a television in the child's bedroom in order to free the family set for parental use. However, when parental TV rules were set and enforced, daily television viewing was reduced by 2 hours.

Beyond their influence on sedentary behaviors, few studies have examined parental influence on child PA. Parents have been reported to negatively influence active transport to school (McDonald et al., 2010) and to place social restriction on free-play outdoors (Hillman, 2006). The correlation between parental PA behaviors and child PA behaviors remains unclear with some researchers reporting no association (Dilorenzo,

Stucky-Ropp, VanDerWal, & Gotham, 1998). More recently, Crawford and colleagues (2010) reported gender-specific positive associations between maternal and/or paternal PA modeling and child PA. In addition, they reported that parental PA rules and parental co-participation promoted child PA. Parental support and encouragement were also reported to positively correlate with PA among minority adolescents (Wilson, Lawman, Segal & Chappell, 2011). Thus, family rules for screen time and PA and parental support and modeling appear to be important contributors to child PA.

THE INFLUENCE OF SCHOOL

The school environment heavily influences the health of its students, both as the primary location of the youth "work day" and as a powerful presence in the community. Because youth spend the majority of their day at school, The American Academy of Pediatrics has recommended that at least 30 minutes of the targeted 60 daily minutes of PA be included within scheduled school hours (American Academy of Pediatrics, 2000). However, changes in school social and political environments have contributed to an overall reduction in youth PA during the school day. Additional social and built environmental changes have effected changes in transportation to and from school, as well as student participation in available school-sponsored PA before and after-school.

Recess and physical education have been replaced by classroom time as greater emphasis has been placed on academic goals. Pate and colleagues (2006) reported that only 8% of elementary schools and 5% of middle schools offered daily PE. This demonstrates that few students are physically active at school and participation is reduced by almost half from elementary to middle school. Additionally, PE class enrollment may not serve as a valid measure of PA as YRBSS data demonstrated that students were active for less than one third of the PE class period (Cawley, Meyerhoefer, & Newhouse,

2007).

Active transportation to and from school provides daily opportunities for youth PA. Unfortunately, data comparing the 2009 National Household Travel Survey (NHTS) and the 1969 Nationwide Personal Transportation Survey (NPTS) demonstrate a decrease in active student transportation - defined as walking and bicycling - over the forty years studied. Only 13% of K-8th grade students reported walking or bicycling to school on a usual school day in 2009, compared to 48% in 1969 (McDonald, 2011). While once uncommon for parents to provide school transport for students, private motor transport is now the dominant form of travel to school, irrespective of travel distance (McDonald, 2011). As a result, only 35% of K-8th grade students living within one mile of school reported usually walking or bicycling to school in 2009, as opposed to 89% in 1969. Additionally, 45.5% of families living within one-half mile of school reported their private vehicle was the usual mode of student transport in 2009. There was little change in the percentage of students transported by school bus or other modes of travel.

After-school PA options depend largely upon the availability of facilities and equipment (Sallis et al., 2001; Durant et al., 2009). Few options are available to youth before and after-school. Much of the middle school and high school PA programming targets organized athletic development and sport participation and few elementary schools offer free-use athletic equipment or intramural participation. In addition, school-yards and equipment are often inaccessible and fenced off outside of the school day - particularly in lower SES communities.

THE INFLUENCE OF THE COMMUNITY

Socioeconomic status, ethnicity and culture

Socioeconomic status appears to moderate PA behaviors, in part, through built

and social barriers in the environment. Families of lower income and education report a greater number of barriers to PA including less access to PA opportunity than other SES groups. The impact of this influence appears to vary with age, gender and ethnicity. Sallis, Nader and Broyles (1993) reported that access to outdoor play opportunity promoted PA in young Mexican-American children. Access to equipment and safe places to play sports correlated strongly with PA. Powell, Slater, Chaloupka and Harper (2006) examined the availability of PA facilities, including parks, by zip code and SES data. They reported a nationwide pattern of poor availability of all types of PA facilities in lower SES and minority neighborhoods. In addition, when examining the associations between access to PA and BMI in adolescent subjects of the National Longitudinal Study of Adolescent Health, low SES and high minority neighborhoods were less likely to have PA facilities than higher SES neighborhoods, with adolescents in these neighborhoods reporting less PA and more overweight (Gordon-Larsen, Nelson, Page & Popkin, 2006).

Likewise, even the aesthetic appearance of the environment can be a critical predictor of PA. Physical disorder in the community, as evidenced by ill-kept streets, graffiti, trash and debris, appears to negatively influence the health of its residents. Slater and colleagues (2010) reported that physical disorder, particularly in low-income areas, was inversely correlated with PA and positively correlated with BMI in a large, national survey of 8th and 10th graders. In addition, social and physical environmental barriers to PA have been strongly implicated in the disparate prevalence of obesity among African American (AA) girls (Crawford, Story, Wang, Ritchie, & Sabry, 2001). Finally, there is a growing body of evidence that culture impacts youth PA. Belcher et al. (2010) recently reported that cultural influences appeared to moderate PA in a large national sample of youth age 6-19. As expected, boys were consistently reported to be more active than

girls, but there were also measureable differences in PA based upon ethnicity. For example, Crawford and colleagues (2001) reported that obesity among AA girls correlated with fewer episodes of vigorous PA. In addition, AA girls have reported less PA than Caucasian girls in national adolescent health surveys (Andersen, Crespo, Bartlett, Cheskin, & Pratt, 1998; Gordon-Larsen, McMurray, & Popkin, 1999; Gordon-Larsen et al., 2006).

Location and Design

It has been reported that rural residents are less physically active than urbanites (Parks, Houseman, & Brownson, 2003; Reis et al., 2004), irrespective of SES. This is likely due to urban disincentives to driving/parking, as well as a greater number of diverse destinations within walkable distances. These conclusions have been based upon the study of adult populations, but these effects are not expected to generalize to children who do not drive. Nor do they share adult destinations. Less is known about the influence of the built environment on youth, but emerging patterns demonstrate that youth may have different environmental needs. While suburban sprawl and rural residence have been reported to inversely correlate with PA in adult (Hillsdon, Panter, Foster & Jones, 2006) and some adolescent studies, urban residence appears to more negatively impact PA among children than living in a rural or suburban community. Karsten (2005) analyzed multi-generational oral histories and observational data to conclude that children in urban neighborhoods are being driven indoors by the transition of outdoor urban space into adult space. She also noted that the impact was greater for children of lower SES. Unlike adults, whose PA correlates with the ability to walk to work and shopping destinations (Klingerman et al., 2007), children are more active in green spaces, depending upon the availability of appropriate outdoor play spaces (Timperio, Crawford,

Telford & Salmon, 2004).

The transition of outdoor urban space into adult space described by Karsten (2005) would be expected to greatly impact children in middle childhood. It has been reported that middle childhood youth limit their independent movement within their neighborhood to the area within 800 meters, or approximately one-half mile, of their home (Timperio et al., 2008). Therefore, PA of middle childhood correlates strongly with the availability of proximate green space and age-appropriate play space for all SES tiers (Timperio et al., 2004). When appropriate play spaces are not accessible, parental or public transportation is required. This limitation disproportionately affects low SES families, where financial and transportation barriers further limit access. At the same time, these children are developmentally seeking greater independence in their quest for PA, e.g. wanting to go to parks without adult supervision. These factors combine to make the availability of appropriate neighborhood play spaces a critical factor impacting PA behavior in this population (Humbert et al., 2006).

Safety and Crime

Studies examining safety as a predictor of PA have relied upon self-reported parent and child perceptions, resulting in conflicting results. Some studies indicate that parent and/or child perceptions of neighborhood safety have an insignificant impact on PA (Adkins, Story, Sherwood & Davis, 2004; Baranowski et al., 1993; Burdette & Whittaker, 2005), while others reveal these perceptions to be highly significant predictors of PA among youth (Carver, Timperio, Hesketh & Crawford, 2010; Slater et al., 2010). There is some variability by age, gender and SES. Preschool-youth PA was not found to vary by parental perceptions of safety (Baranowski et al., 1993). However, safety perceptions were reported to predict PA among older children and adolescents (Carver et

al., 2010, Slater et al., 2010). Preschoolers and young children are usually under adult supervision and protection, and may be sufficiently active in and around the home, regardless of neighborhood safety. In contrast, older children seek increasingly independent movement within the community and resist adult supervision and protection. Thus, it may be that parents will be more restrictive in the movement of older children who seek to reach what are perceived to be less safe areas outside the home.

Perceived versus Objective Assessment

Parents consistently report fear of harm to their children by strangers (Carver et al., 2010; Timperio et al., 2004). In fact, objective crime data indicate that children are far more likely to be harmed by a family member or peer (Finkelhor & Ormrod, 2001; Finkelhor, Turner, Ormrod & Hamby, 2009). Objective crime-against-children statistics have only recently become available as crimes are now reported by age of victim (Finkelhor & Shattuck, 2011). Juveniles are the victims of 9% of crimes reported and simple assault is the most commonly reported crime. Additionally, parental perception of risk appears to be increasing in the United States and Europe despite the fact that this perception rarely correlates with actual risk and has occurred irrespective of the SES and neighborhood of residence (Carver et al., 2010; Prezza & Pacilla, 2007; Timperio et al., 2004). This applies to child perceptions as well. Slater and colleagues (2010) reported that student perceptions of safety were positively associated with youth PA despite the absence of association with objectively measured levels of traffic danger. Thus, there appears to be a discrepancy between perceived and actual risk in the social and built environment. Additional research is required to more fully understand this dynamic, as these perceptions appear to drive parental protective behaviors with regard to PA.

Carver and colleagues (2010) reported that parental perception of risk may trigger

parental restrictive behavior and reduce child PA. It is important to note that the perception of risk appeared to have much to do with the perceived vulnerability of the child. Parents were more restrictive with girls of any age and with young boys. Clearly, parents perceived these children to be at increased risk and in need of additional protection. Youth perception of risk, however, did not predict restrained behavior among children as it did in adolescents.

Interestingly, the restriction of childhood activity may paradoxically influence perceptions of risk and social connectiveness in adolescence. Prezza and Pacilla (2007) surveyed a large sample of Italian adolescents to identify predictors of adolescent fear of crime reported in the US and Europe. They reported that the freedom to play in public places and move independently within their neighborhood at 8-10 years of age predicted a positive sense of community and less fear of crime later in adolescence. Therefore, encouraging independent movement in middle childhood was developmentally advantageous and fostered a positive relationship between the child and his/her community.

In summary, parental perceptions of safety appear to impact PA by increasing parental restriction and decreasing the child's independent access to PA areas. This occurs despite discordance between the perceived and measured safety risk. Thus, while perceptions of safety are associated with child PA, objective measures are unrelated to PA. There may also be variability in the perceptions of availability of PA sites that are appropriate for youth activity. While this possibility has yet to be examined, this would clearly be expected to impact middle childhood PA and is worthy of further study.

Developmental and Theoretical Considerations

The Social Ecological model (Figure 2.1) helps to inform our understanding of the individual within their community and has been adapted for children by Sameroff (2010), as depicted in Figure 2.2 below. It is a fitting illustration of the influences of the bi-directional relationship between the environment and the child. These influences progress from the close interpersonal relationships of the parent/caregiver to progressively more distant relationships, groups or organizations, and finally, the community as a whole.

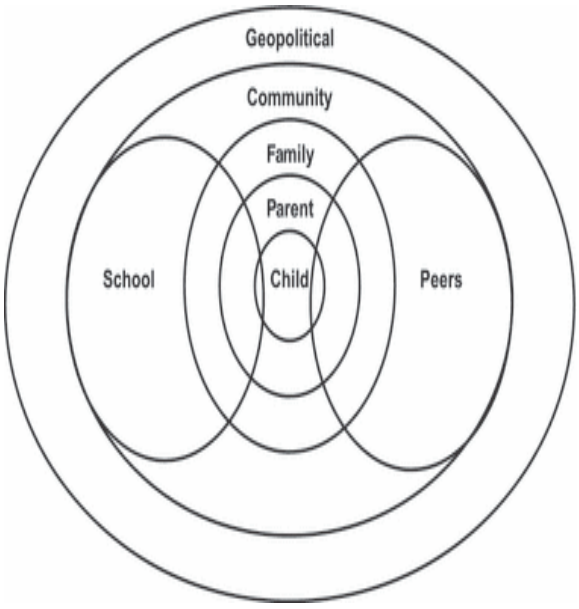

Figure 2.1 Social Ecological Model (Sameroff, 2010).

However, as interpreted by Sameroff, it is not appropriate to apply this model to children of all ages. The ability to interact with each of the levels will vary as a function of the child's development and independence. Thus, there is a gradual transition from a state of complete dependency upon an adult caregiver to an increasingly independent individual. This trajectory is represented in Figure 2.2 below.

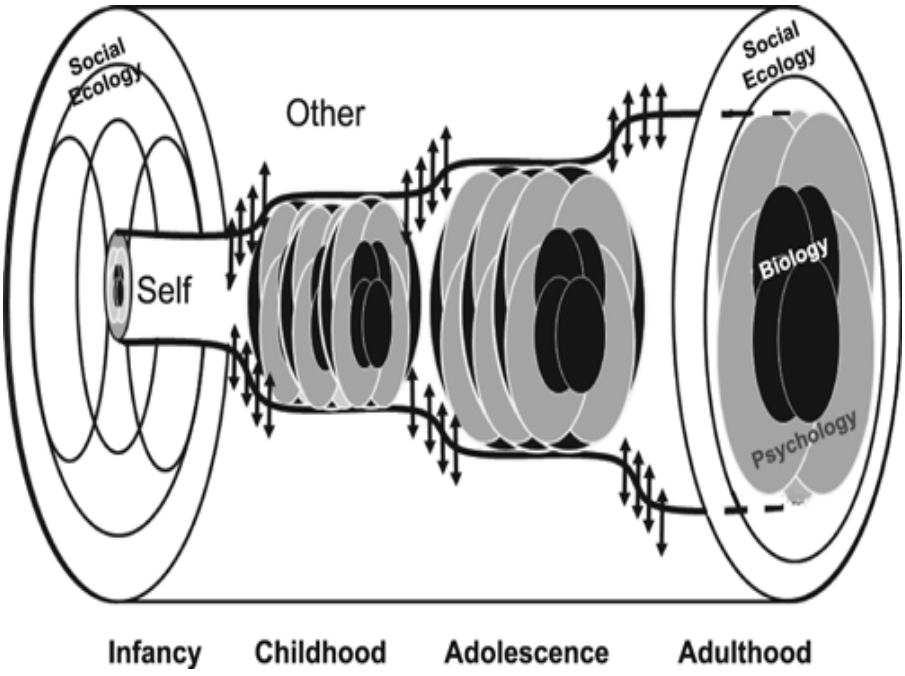

Figure 2.2 A Unified Theory of Development, (Sameroff, 2010).

Sameroff (2010) illustrated this developmental progression or *Unified Theory of Development*, as an enlarging central circle representing the individual within the family, influential groups and community. The young child is represented by a small circle,

representing dependence upon close adults. As the child develops and becomes more independent, he/she is able to engage and more strongly impact the larger environment. This is minimal at first, but slowly grows as the child develops and gains independence. Understanding the role and influences of the developing child and the people, groups and organizations in his/her environment increases our understanding of the determinants of his/her behavior, including health behavior, and potential targets for prevention and treatment. Thus, it is important to understand the process of development and independent engagement within the context of the environment. Many theorists have proposed various methods of defining developmental stages in childhood. One of the simplest methods of staging broadly divides childhood into *Early Childhood,* birth to 5 years of age, *Middle Childhood,* 8 to 12 years of age and A*dolescence,* 12 to 18 years of age. Middle childhood is the time when children are believed to strengthen cognitive skills and exercise motivation to accomplish specific actions and goals. Personality is refined and the development of interpersonal skills and a growing independence promotes the integration of self with society (Shonkoff & Phillips, 2001). In middle childhood, children are becoming more independent in their interaction with their environment and they are better able to formulate goal-oriented behavior as they become more self-directed. Because this often leads to tension between the parent's protective behavior and the child's desire for independence, this is a particularly interesting stage in which to examine the impact of the environment and parent perceptions on child PA. Likewise, as the child ages, his/her PA needs change. What was an ideal PA environment in early childhood, e.g. low swings, sand box, etc., is no longer of interest in middle childhood. At the same time, adult-oriented environments, e. g. walking and jogging tails, etc., are not yet of interest.

Recognizing the importance of health throughout the lifespan and the importance of developing an early, healthful life course trajectory (Halfon, 2009), the US Department of Health and Human Services has adopted the use of the three developmental stage model in creating the Healthy People 2020 goals. For the first time, health goals have been included for early and middle childhood populations. These goals include the prevention of obesity, among others, and acknowledge the need to better understand and create healthful environments for children of all ages in homes, schools and communities.

Objective Environmental Measures

In 2009, the Robert Wood Johnson and NIH sponsored *Measures of the Food and Built Environment Work Group IV* published their recommendations for the direction of future research related to environmental influences impacting PA (Story et al., 2009). This group of experts recommended combining qualitative and quantitative techniques in natural studies to identify the relevant environmental factors and mechanisms of environmental influence on PA. They also recommended the development of community partnerships to enable observational studies and the development of new methodologies for study design and analysis.

Environmental measurement tools are available to assess the built environment and include both self-report measures and systematic observational measures. Several self-report environmental surveys or check-lists are available to assist participants in the systematic assessment of resources within their environment. These include SPACES, PANES, NEWS and the ACTIVE WHERE? SURVEY. Each of these will be discussed further in this section. In addition, there are validated, systematic, observational tools available to researchers that are reported to have adequate reliability when used by trained researchers to record directly observed data. The systematic, observational tools

have the additional advantage of enabling not only the assessment of availability of PA resources, but also the PA behavior of the targeted subject within the targeted environment. These tools include SOPLAY, SOPARC and SOFIT, which will also be described in detail below.

Environmental self-reports are completed by the subject and help direct the identification and reporting of PA resources within the participant's environment. Neighborhood Environment Walkability Scales (NEWS) are available in several forms for different age groups. This tool was developed to comprehensively examine the walkability of the environment. The Systematic Pedestrian and Cycling Environmental Scan (SPACES) (Pikora, Giles-Corti, Bull, & Jamrozik, 2003) and Physical Activity Neighborhood Environment Scale (PANES) assess both walkability and cyclability of the community. ACTIVE WHERE? SURVEYS are designed for parents and children to complete and assess the availability of PA resources in their community.

Conversely, systematic observational measures utilize timed, direct surveillance of people in the places where PA is expected to occur. The researcher systematically scans the defined area, pausing to record data assessing the person and place of activity as prompted by the specific tool. The goal is to produce a precise scientific record of the trained researcher's systematic observation. The System for Observing Play and Leisure Activity in Youth (SOPLAY) developed by McKenzie (2000) is a direct observational tool intended to identify when and where adolescents utilize leisure time for PA. The System for Observing Fitness Instruction Time (SOFIT), also developed by McKenzie (2000), is a systematic observational tool used to assess and record instructor behavior and student activity within the context of a physical education class. The System for Observing Play and Recreation in Communities (SOPARC) (McKenzie, 2002) was

originally developed to assess participant PA behaviors within public parks. The subject's demographic information including age group (*child, teen, adult, older*), ethnicity, gender, activity and intensity of activity are assessed visually by a trained researcher and recorded on the SOPARC form (Appendix A, page 121). SOPARC has since been successfully used to assess PA in other recreational locations. The tool was refined by Bocarro (2009) to enhance its use in pediatric populations. The child category was subdivided into the three developmentally-based age groups currently in use by the US Department of Health and Human Services to define Healthy Goals 2020 for children. These three systematic observational tools are used by researchers to manually record timed, direct observations but differ in their targeted environment and context.

The SOPARC tool offers the most complete data set for the purpose of this dissertation and includes valuable information related to the PA behaviors of youth within a broadly defined environment. Additionally, the data is generated through the direct, systematic observation by trained researchers, rather than self-reported data. Lastly, these features support the recommendations by the *Measures of the Food and Built Environment Work Group IV* for the observational study of environmental influences on PA. Therefore, the SOPARC will be the systematic observational tool employed in Study 2 of this dissertation.

The recommendations of the work group also included the development and use of new and innovative methods of study and analysis and referenced the use of geographic technology. The objective environmental study of complex research questions can now be facilitated by rapidly evolving technology, including Geographic Information Systems, satellite imaging and computerized data visualization. These tools are useful in aiding the analysis of the complex interaction of people and place and the resulting

impact on PA behavior.

Geographic Information Systems (GIS) utilize computer hardware, software and data sets to capture, manage, analyze and display geographically-referenced data. GIS allows quantitative data to be analyzed taking into consideration the relationship between data and location. These data are then displayed as a color-coded map and multiple map overlays can be simultaneously positioned over the satellite image of a geographic area under investigation, thereby, creating a visual display of the interaction between data and location. For example, the review of relevant literature indicates that fear of crime is a potential environmental barrier to PA in middle childhood. Objective data resources such as East Austin crime data from the Austin Police Department can be mapped by color-coding areas of prevalence rates. These visual representations of quantitative data can then be mapped directly over the neighborhoods of interest, thereby creating a visual representation of the impact of crime upon PA behavior. Other computer-assisted visualization and spatial analysis techniques are available in addition to GIS.

In conclusion, spatial data analysis and data visualization techniques are now available as the result of computer and satellite technology. The ability to analyze and display quantitative data, represented as a function of location is particularly advantageous in the study of individuals and populations within their environment. These techniques will be employed in this exploration of the environmental influences upon PA behavior in middle childhood.

SUMMARY

The prevalence of childhood overweight/obesity continues to rise with increasing disparity. The sequelae of unhealthy weight gain have been demonstrated as early as childhood and often extend into the chronic disease of adulthood. Physical activity has been identified as beneficial in the prevention of unhealthy weight gain and the moderation of weight-related chronic disease. Yet, while the social and built environments appear to strongly influence PA in middle childhood, these influences are poorly understood.

Transitioning development and limited independence distinguish middle childhood from adulthood and adolescence and prevent inferential conclusions based upon the study of older populations. Although data are limited, middle childhood PA appears to rely on access to developmentally-appropriate green space that is within walking distance (1/2 mile). Unfortunately, the available space is often not age-appropriate and fails to match their preferred outdoor play. In addition, one would expect them to be especially vulnerable to parental perceptions of the availability and safety of these green spaces and the built environment that surrounds them. Despite these hypothesized relationships, very little research has examined middle childhood youth and their PA behaviors. Fewer still have investigated the perceptions of their parents. Clearly, there is a need to specifically examine minority populations who live in lower SES neighborhoods. Given the discordance between perceived and observed environments, it is important to also verify these perceptions with objective data when possible. It is only

by doing so that we can understand the specific challenges and barriers to PA in middle childhood and design appropriate interventions to increase PA in this population.

In response, this dissertation is designed to examine the individual perceptions of minority children and their parents residing in a lower SES community concerning the social and built environmental barriers to PA among middle childhood youth and to compare those perceptions to each other and to objective measures. In order to achieve this aim, parent focus groups and middle childhood student focus groups will explore the perceived barriers to childhood PA within the participants' community. The results of the focus group discussions will serve to identify the targeted neighborhoods and PA facilities to be examined using objective geographic data and systematic objective measures of barriers to childhood PA. The resulting data will serve to inform the development of educational interventions and public policy strategies to increase PA among middle childhood youth in the lower SES urban community. The exploratory nature of this investigation will be strengthened by a mixed method study design, allowing the unrestricted expression of parent and child perceptions, coupled with objective observation in the natural environment.

CHAPTER 3: METHOD

Study 1: The Focus Group Discussions: A Qualitative Exploration

RATIONALE

This was a qualitative study and, as such, was exploratory in nature. The context, the community setting and the frame of reference of the parents and the children remained central to the investigation. The ethnographic approach was chosen because the influences of family, community and environment are complex and were expected to be more completely revealed through the perceptions expressed by the parents and their children as personal stories and quotations without the limitation of directed questioning and preselected response options.

Still, the exploration was a scientific, systematic inquiry. The open prompts informed by current knowledge and semi-structured discussions fostered the synthesis of a descriptive narrative of shared personal experience influenced by tradition, culture, family, community, school and personal action which would be impossible to achieve with a quantitative study alone. This approach elicited a more complete understanding of the complex circumstances impacting childhood PA behavior within the lower socioeconomic, urban community. The perceptions of parents and their children regarding childhood PA in their community were revealed by the organization and analysis of this collection of life experience which serves to inform the formation of hypotheses and the study design of subsequent quantitative investigations.

RESEARCH QUESTIONS:

Research question 1.1: How do parents perceive built and social environmental barriers to their middle childhood-aged youth PA within the East Austin community?

Research question 1.2: How do youth perceive built and social environmental barriers to middle childhood PA within the East Austin community?

Research question 1.3: How will the parent perceptions compare to the youth perceptions of built and social environmental barriers to middle childhood PA within the east Austin community?

THE SCHOOL COMMUNITY

A charter elementary school located in the East Austin community of Austin, Texas was chosen for this qualitative study. The school is centrally located within the East Austin community. An East Austin place of residence is a requirement of school matriculation, therefore the school families reflect the East Austin population. Approximately one fifth are foreign-born and almost half of the parents have not completed high school. The East Austin community is a lower socioeconomic area where one quarter of its residents live below the poverty level. The student population includes children from every East Austin community zip code and represents a variety of the community neighborhoods. The school population reflects the diversity of the community with an ethnic composition that is 74% Hispanic, 17% African American, 8% White and 1% Asian. Forty-eight percent of the students were male and 52% female with greater than 90% of the students eligible for free or reduced school lunch at the time of this

study.

APPROVAL

Approval for the study had been obtained from the school administration and all relevant administrative and governing bodies. The primary investigator has developed trusting relationships with the personnel and families of the community based upon years of co-working relationships and prior work within the community. Discussions and negotiations concerning reciprocity expectations were completed. A statement of support was secured from the school. IRB approval was secured through the University of Texas prior to the study. Confidentiality and protection of personal information was assured by the unique coding of personal identifiers. Home addresses were modified to the nearest intersection to protect the identity of the family.

PARTICIPANT RECRUITMENT

Students from the charter school's third, fourth and fifth-grade classes and their parents were targeted for this study. Letters were sent to the parents of the students one week before each of the three focus group events, informing them of the planned focus groups and inviting them to participate. Grocery gift certificates of $10 value were offered to all participants as compensation for their time. The focus groups were scheduled in the early evening, child care and a family meal were provided at no cost to encourage family participation. Recruitment information appeared on the school website prior to each focus group event. Through this effort, 21 parent-child pairs were recruited. The ethnicity of focus group parent and student samples was estimated at 90% Hispanic

and 10% African American.

FOCUS GROUP DATA COLLECTION

As context is of importance in any qualitative study, data collection occurred in the participants' natural world, with focus groups conducted in the school. Written parental consent and student assent were obtained immediately prior to the focus group discussions. Parent focus groups and student focus groups were held on three different dates. Parents and children attended separate, simultaneously scheduled focus groups. Data came from a total of six focus groups: three parent focus groups and three student focus groups.

Parent perceptions were collected from parent-only focus groups and parents were offered the option of attending either English- or Spanish-speaking focus groups. Because classes at the school are taught in English, child perceptions were collected from student-only focus groups conducted in English. The parent and student focus group discussions were held simultaneously and lead by experienced and trained facilitators.

Predetermined prompts were used to initiate the semi-structured group discussions. Active listening statements and/or follow-up questions were offered to encourage more specific detail and wider participation. The discussion prompts included questions regarding perceptions of the value of PA; PA barriers and facilitators within the built and social environments of the community and PA access and PA participation experiences at home, school and in the community.

The specific prompts used are listed below:

Parent Focus Group Prompts

My child needs physical activity because_____.

My child gets physical activity by _____.

Our family likes to be outdoors doing _____.

I wish there were more places to be active in our neighborhood such as_____.

The children in our neighborhood like to play_____.

I would like to see more _____ and less _____ in our neighborhood.

Safe places to play in our neighborhood include _____.

I think these are some of the reasons the children don't play outside._____.

Student Focus Group Prompts

My favorite outdoor activity/sport is _____.

In our neighborhood, my friends and I play _____ at _____.

I like to play outside because _____.

I don't like to play outside because _____.

I would play outside more if _____.

I think my whole family would come out to play if_____.

I wish we had a _____ in our neighborhood.

I wish we didn't have a _____ in our neighborhood

Focus group discussions were audio recorded. Additionally, a "real time" written record of the focus groups was created by a scribe during the focus group. Careful attention was given to the trustworthiness of the recorded data and participants had the opportunity to correct the written record as it was created on poster-sized sheets positioned next to the focus group leader and posted to the walls of the room. The audio recordings were professionally transcribed and the transcripts were reviewed for accuracy.

DATA ANALYSIS PROCEDURE

The goal of this data analysis was to synthesize the focus group perceptions from the parents and youth into a cohesive, critical interpretation of the major findings from the group discussions. The ethnographic approach of this study sought to identify, merge and interpret the collective experience of the focus group participants. The transcripts created through ethnographic inquiry were analyzed by established qualitative data analysis techniques in order to assess the individual stories and experiences, and the social and environmental factors that shaped them (Marshall & Rossman, 2006; Miles & Huberman, 1994). This process is described below.

Prior to the focus group discussions, a preliminary list of expectant dominant themes or expected topics was created based upon the review of the literature. Discussion topics were given theme names and additional themes were added, refined or deleted, based upon the topics that are recorded in the focus group transcripts. These themes and codes are listed in the Code book found in Appendix A. Individual stories and quotations

were cultivated from the transcripts, grouped and organized by coding theme. Following the coding, cultivating and grouping of quotations, life stories and life experiences of the youth perceptions and the parent perceptions, the interpretive analysis began. The qualitative interpretive analysis began with the writing of a descriptive summary of the grouped perceptions as described by Marshall and Rossman (2006) whereby the researcher's goal was to allow the perception of the participants to structure the interpretation. This approach is intended for the purpose of summarizing descriptive data related to a social context which can then be related to existing theory, but not intended to be used to build theory. It is described as slightly more interpretive than a "purely descriptive life history" approach, incorporating some comparison of contrasting views and varied word choices within the group. Finally, a thematic conceptual matrix was created as described by Miles and Huberman (1994) for the purpose of summarizing and displaying the perceptions of the parents and youth to facilitate further interpretation and comparisons between the parent perceptions and the youth perceptions. This technique allows additional analyses, such as making contrasts and comparisons. The ordered display helps to illuminate the similarities and differences between the parent and student perceptions as expressed in the focus group discussions. At the conclusion of Study 2, this conceptual matrix will serve as the framework upon which to summarize the parent and youth perceptions and the objective assessment in order to facilitate further comparisons.

Study 2: The Environmental Assessment

HYPOTHESES:

Hypothesis 2.1: There will be discordance between the objective assessment of environmental barriers to middle childhood youth PA and the perceived environmental barriers reported by the focus group parents.

Hypothesis 2.2: There will be concordance between the objective assessment of environmental barriers to middle childhood youth PA and the perceived environmental barriers reported by the focus group youth.

Hypothesis 2.3: The spatial analysis will identify insufficient access to recreational sites appropriate for middle childhood youth PA within the one-half mile radius of the selected homes of residence.

Hypothesis 2.4: The systematic objective observational data will demonstrate that:

- the majority of recreational site programming is planned for adult participants
- the majority of PA facility users are not middle childhood youth
- the majority of community school facilities are not available for unorganized play after school

THE COMMUNITY

This objective environmental study focus was on the East Austin community, which has a land area of 10.28 miles and an estimated population of 32,716 people. The ethnicity of the community population is 33% African American and 65% Hispanic with 15.6% speaking little or no English. Twenty percent of the community residents are

reported to be foreign-born. The East Austin community is identified as a lower socioeconomic area where 30% of residents earned an annual income below the 2010 poverty level. Sixteen percent earned incomes below 50% of the 2010 poverty level (www.city-data.com, 2012). Twenty-three percent of adult residents have completed high school or the equivalent and 46% have no high school diploma or equivalent. The community is densely populated with >4,258 residents per square mile (www.city-data.com, 2011).

STUDY OVERVIEW

This study sought to further explore the built and social environmental barriers to PA for middle childhood youth in the East Austin community. A mixed-method design utilizing spatial analyses, Geographic Information System (GIS) mapping and systematic objective observation was used.

PHASE 1: SPATIAL ANALYSIS

All identifiable residential addresses of the parent-child participants from Study 1 were modified to the nearest street intersection and located on a map of the East Austin community. Five parent-child block of residence sites were selected from Study 1. The residences chosen were selected to maximize their spread and allow for a varied exploration of the different East Austin neighborhoods. Using the block of residence as the center, an approximated one-half mile radial area was created on the map to delineate the expected area of independent movement by the youth, based upon the literature review and Study 1 youth-perceived estimates of one to five blocks. The area within the

approximated one-half mile radial area of study of the five selected sites defined the East Austin *neighborhoods* that were analyzed by spatial analysis.

The spatial analysis of each neighborhood included mapping and analysis of:

1. *The approximated one-half mile radial area:* Five family blocks of residence were selected from the family residences of the participating families of Study 1. The block of residence was indicated as a red dot in the center of an approximated one-half mile radial area, the expected area of independent movement by the youth.
2. *Potential recreation sites within the mapped area where middle childhood-aged youth could engage in PA:* Potential recreation sites located within each neighborhood circle were identified by satellite data and field observation. These were indicated as a green square.
3. *Access and barrier mapping of walking and bicycling routes to and from the home and potential recreation sites within the mapped area:* The most direct access from the block of residence to the recreational site within the mapped neighborhoods was mapped. Barriers to access including heavily traveled streets or highways, rail-road tracks, private property and fenced or unsafe areas were indicated on the map in bright yellow.
4. *GIS overlays of traffic danger data and crime data:* Utilizing local and national geographic information systems data from the Austin Police Department and the City of Austin, reported crime data and traffic danger

was visually depicted as map overlays of the neighborhoods of study. Additionally, because not all crime impacts children and assault is the most commonly reported crime against children, individually reported crimes and assault crime rates of the neighborhood were reported.

PHASE 2: SYSTEMATIC OBJECTIVE OBSERVATION

Four recreational sites were selected from these neighborhoods and the focus group results of Study 1 for a more detailed, systematic observation utilizing the SOPARC method of observation, as revised by Bocarro, 2009. These sites included a representative sample of accessible PA sites identified by the spatial analysis mapping of the selected neighborhoods and/or sites named by the parent and/or child participants from Study 1 as PA sites they use. The sites included school playgrounds, local parks, and public recreational and activity centers. The systematic objective observations examined recreational site access to, programming for and usage by middle childhood-aged youth, and included:

1. *Direct observation*. Up to two trained researchers systematically scanned and coded gender, estimated age group and PA behavior of subjects at the identified sites using the System for Observing Play and Recreation in Communities (SOPARC) (McKenzie, 2002). The SOPARC protocol was followed, as modified by Bocarro and colleagues (2009). A second trained researcher simultaneously, systematically observed and coded gender, estimated age group and PA behavior at two of the selected site observations in order to insure reliability of the observation record.
2. *Field artifact collection:* Programming schedules and property lay-outs of

public recreational facilities were collected as part of the direct observations for a qualitative assessment of the facilities, scheduled programming and free-access availability for middle childhood youth PA.

SOPARC is suitable for recording PA in recreational sites, as well as parks (McKenzie, 2002). Interobserver agreement and intraclass correlation are reported as acceptable: IOA=80%, R=.75 (McKenzie, 2006). The observer scans the recreational area from left to right, pausing to observe each subject for 5 seconds, recording for 5 seconds and then moving on to the next subject within view. The systematic observation and recording of data is continuous for the defined observation period. A modified protocol developed by Bocarro and colleagues (2009) and validated in a study of over 2,000 children was used in order to incorporate additional participant categories. Specifically, the SOPARC category of *children* was expanded to include estimation of *young* (ages 0-5), *middle* (ages 6-12) and *older* (ages 13-18) *aged children* in order to allow a focused assessment of use by children at different stages of development. Observations were recorded during after-school hours of 4:30 PM to 6:00 PM on 2 weekdays and from 11:00 AM to 1:00 PM on 2 weekend days. Observers received training in estimating the ages of children based upon appearance and behavior and the use of the SOPARC tool. Training in age estimation, using photographs of children of various ages, was followed by field training.

DATA ANALYSIS

Spatial data analysis was used to analyze and display spatial environmental data, including proximity analysis. Available PA sites within the mapped area were identified and mapped. The proximity of PA sites to the home and travel barriers were depicted visually on the neighborhood maps.

Geographical Information System (GIS) data from the Austin Police Department

and the City of Austin were used. This included data representing traffic danger and crime reports specific to the area within 1,000 feet of the block of residence. These data were incorporated as overlays to the maps of the neighborhoods. Descriptive statistics and graphic data visualization of usage by middle childhood-aged youth were used to report objective systematic observational data. SOPARC subject descriptor classifications were analyzed and compared by site. Qualitative analysis techniques using conceptual matrices were used to compare the parent and child perceptions of social and built environmental barriers to PA reported in the focus group discussions with those identified by the objective observational data.

CHAPTER 4: RESULTS

Study 1: Focus Groups

PARENT FOCUS GROUP RESULTS

The written transcripts were analyzed for expected and emergent dominant themes of discussion (Table 4.1). The preliminary theme list was informed by the literature review and included topics expected to dominate the focus group discussions: (1) *Traffic*; (2) *Crime*; and (3) *Technology*. In addition to those expected, based upon the literature, additional themes emerged in the participants' discussions which served to bring focus to the group's perceptions and concerns. These were added to the analysis as the goal of the focus group discussions was to harvest parent perceptions. The dominant additional themes included: (1) *Parent-perceived value of physical activity* and (2) *PA Programming*, including supervision and cost.

The parental perceptions regarding environmental barriers to middle childhood PA are presented here organized as built and social environmental barriers. Built environmental barriers include road traffic and social environmental barriers include crime, technology and access. Each section begins with a summary of the views expressed. Alternate expressed views are also included. Quotes and stories that serve as examples of the dominantly expressed view follow each summary.

Parent Data Analysis Themes	Student Data Analysis Themes
Built Environmental Barriers	Built Environmental Barriers
Traffic	Traffic
Social Environmental Barriers	Social Environmental Barriers
Crime	Crime
Technology	Technology
Access - Physical Activity Programming	Access – Age-appropriate Play Space
	Parental Restriction
	Family Inactivity

Table 4.1 Study 1 Dominant themes for focus group analysis.

Parent-perceived value of PA

The parents had high praise for the value of PA, not only as a means to promote physical health and prevent disease, but also as a means to improve mental health, specifically mood and confidence. "...PA is important," stated one parent. No parent expressed the view that PA was not important. When the parents were asked how they would rate the importance of PA for their child on a scale from 1 to 10, the audible responses included:

"I would say 10."

"10 here, too."

"I would say at the highest."

Some participants acknowledged the value of PA specifically as a means to

promote physical health and prevent specific at-risk disease:

"Yes, I do feel my son needs to be physically active because his body weight mass is a little bit over the chart and I think that as far as health reasons, it should be part of his lifestyle."

"Same thing. I believe so because his genes in his family. There's a lot of diabetes and high blood pressure. And he's over weight as well."

"Mine's the same with diabetes, high cholesterol, he already has high cholesterol and he's only 8 years old."

"It's good for his heart."

Additionally, parents verbalized that they had noted positive *mental health changes* in their children as a result of PA:

"I think it makes them happy. It makes my little girl much happier and she sleeps much better at night. She doesn't have any dreams or knocking on my door in the middle of the night. She feels strong. She says she feels strong."

"It's good for his motivational skills. I've seen all that in him."

"With my daughter, it's given her a lot more confidence. She's a lot more confident in herself."

Parent-perceived environmental barriers to childhood PA

Yet, while aware of the benefit of PA, the parents also perceived many social- and built-environmental barriers to middle childhood PA in East Austin, as revealed in the analysis of these parent focus group discussion data. The primary built environmental barrier identified by the parents was a heavily utilized motor traffic network creating an unsafe pedestrian and bicycling environment, although there was not a clear consensus

concerning the lack of sidewalks, specifically. Parents perceived crime, primarily stranger abduction**;** the displacement of PA by technology**,** including television and video games**;** and a lack of age-appropriate programming at a reasonable cost at local PA site as social environmental barriers to middle childhood PA in East Austin.

Parent-perceived built environmental barriers

Road Traffic

Many parents expressed that walking and bicycling, the primary modes of independent transportation in middle childhood, were not safe options in their community. The parent's statements revealed a perception of inadequate protection for pedestrians and bicyclists due to heavy traffic, frequent speeding cars, distracted drivers, and a paucity of sidewalks. Additionally, because many of the intersections were four-way stops, cars were not checking for non-motorized traffic before proceeding through the intersection. In contrast, some parents reported ample sidewalks in their neighborhood and some acknowledged an emerging attitude shift in recently repurposed areas where pedestrian traffic has increased. Specifically, parents expressed these perceptions related to traffic as a built-environmental barrier to childhood PA in East Austin neighborhoods:

<u>General traffic</u>

"My grandmother and my mother live on the East side of * street and when we're at their house they can't go very far. There's traffic. There's really nowhere to go in the area. But in my area, they can walk to the end of the street. It's about, I think I can estimate, maybe like 50 to 60 meters, like walking your dog."

Speeding cars and distracted drivers

"…everyone isn't driving safe for the kids on the bicycle. Even these subdivisions- they're zooming around because they're so many things on a person's mind now that they're not even thinking about."

"Our street's pretty busy. They drive pretty fast through there so I wish we had speed bumps."

"There's so many cars driving too fast."

"They're on the phone or they're texting or whatever it is."

Railroad and Metro tracks

"But it would be across the intersection and the railroad tracks. That would be a concern."

"It's really scary here. We've got the metro rail that passes right here and then the street is so busy because now 6th street is moving out this way toward the school."

Sidewalks

"Well, my kids have bikes, but for the same reason, on my street there's not a sidewalk. There's a sidewalk on the main street. And even sometimes when we do go out, because the age of my kids, of course the other ones are going to ride their bikes really fast and be really way ahead of us, but we still want to keep an eye on them just because the streets are kinda narrow and the car pass by so fast and they really don't pay attention really."

"People do not respect people. They don't respect pedestrians. It's really, really frightening sometimes being a pedestrian here in Austin. There's cars."

"There's plenty of sidewalks."

"Yeah, around the whole neighborhood, there's no sidewalks."

"In my neighborhood, we don't have sidewalks. It's kind of out in the country."

Crossing street, no lights, four-way stops

"People don't respect. We have kids crossing on the crossing in the corner and grandpa said they were crossing the other day and a car just went right by - didn't even stop at the stop sign - and missed them by this much."

"Because this is a four-way stop. There's not a light. There's a stop."

Parent-perceived social environmental barriers

Crime

Many parent participants reported that fear of crime in the community was a barrier to middle childhood PA and independent travel of middle childhood youth to PA sites. These parents expressed the need to restrict the activities of their children, primarily because of a fear of stranger abduction. However, they also mentioned awareness of sexual abuse and neighborhood drug activity, as well as burglary. Fewer parents reported that their children were free to play outside, as a result of organized supervision or a neighborhood or housing watch program. A representative sample of the crime-related barriers perceived by parent participants included:

Parental Fear

"It's all the fear of what is going to happen, what could happen."

"My kids probably just get their physical activities just at school or on the weekends like when we're out. Because I don't even want to let him outside."

"Well, during this day and age you can't not go outside with your children. You have to have a parent."

"...So, it just makes me nervous. So he does most of his playing in the backyard,

or we actually have an empty lot next to us full of trees so he plays in that area, and I feel fine. I would fell better if it were gated."

"If you live in an apartment complex. You see too many kids wandering around without parents watching them. There's too many things going on, too many bad people coming in, walking around. Or you're afraid that your child is going to, something may happen, so you're either outside with them and just watching them, but most of it is just the environment that we live in now compared to back then. Ten, twenty years ago you were able to go outside and play. Everything's different. You can't." (Five parents agree).

Abduction and Sexual abuse

"You turn on the TV, they snatch your baby from the front yard, so everybody has to be in front of their kid all the time. And mommies and daddies who work all day long, sometimes that's hard because you've been at your job for nine hours…"

"Now you can't do that because you don't know if one person will drive by and just take your kid away. You can't go out there without you being out there. You can't. You can't trust anybody. Whether you're in an apartment, whether you live in a house, you can't trust anybody. There's too many sexual offenders out there. Even though you don't know what class they are, they're still out there. So it's just very different that, I want to say, twenty years ago."

"Because the moment that you take your eye off your child - one minute, or even just a couple of seconds, that child can be gone. Too much stuff has happened where people just, from one moment to the next, even though you say, just turn away for twenty seconds your child can be gone in less than five."

"Because me, I always have to be right, right there. Even if it's at a distance that I

can see her, that's still not good enough for me. It has to be a distance where I can get up and actually reach for her just because is less than a minute to me, anything can happen. Somebody can come and grab her by the time I get over there they're gone."

Drugs and Alcohol

"Yeah, because I've walked with *. I'll tell him let's go walking and he right away, let's go from here. There's too many out here. They're drinking or they're already drunk, passed out."

"Well just because we've gotten so much stuff stolen from us before and there's always people walking up and down the street. Guys have came and knocked on our door selling stuff that's stolen so just all of that in general. And I've looked before on the sex offenders and there's quite a bit just in I would say in my block."

"I suppose I was raised in an area in South East Austin that has always had its share of cops and drugs and all that stuff. It hasn't ever affected my home. I've been fortunate that it doesn't happen on my block. Perhaps across the street on that block, it just hasn't physically affected my block. But he's seen cops come and he's overheard people arguing down the street. It just doesn't happen in my home. And being older than your average mother I suppose I've just learned to stop what I'm doing and go outside and make sure that he's just being watched. That's really the only way that I've been able to make a difference for him because it's everywhere. We go in areas, very nice neighborhood watch areas and they talk about crime over there. The only difference is I actually stop cooking and know that I'm going to have to give up on something to just look at him. That's the only thing that I've seen works for me."

Neighborhood watch

"...because we have a neighborhood watch program that we had hooked up to the national watch. So we can email each other and it goes out to the entire neighborhood if we feel unsafe about a certain person, if we got something stolen. So we do have a very tight-knit community where I live. And we have quite a bit of young people that live there, younger families mix with older families. I hate to say this, but kinda the outskirts of where we live is a rough neighborhood. So that's why we have to keep that tight-knit."

"In my neighborhood, the children are outside all day long.... All the kids are out there skateboarding or on their bikes or playing with balls."

Displacement of PA by technology

When the focus group parent participants were asked why their children don't play outside more, they readily acknowledged that the use of technology in the form of computers, television, and hand-held electronic devices has replaced time spent in PA at home. Despite the cost of this technology, there appeared to be few parent participants in this low SES sample who did not report the presence of multiple forms of technology in their home. Many expressed that they did not see a need for restricting usage. A sample of participant perceptions included:

Videogames

"... has a handheld DSi, but he's not addicted to it. If he had a choice between that and to go play basketball with me, he'd want to go play basketball, since he says he can beat me."

"I think the world is just not very targeted towards (fitness). Now they're coming out the with *kinect* and the fitness board - all these things - but it's more technology. The

kids want to play computer, they want to play these video games. And when I was little we didn't have those. We played with… Rocks. … dirt and sticks outside. And we were always running playing kickball and chase outside to make a game, but now there's so many things that kids they just want to do inside and stay inside at home. ... these video games can actually become active is a good thing, but the world for a moment there, the technology, the iPad and the iPod- all these things. The kids want them, especially when their friend at school has them and they got to have it or they're not as cool. It's just hard trying to say, you know stop playing the video game, when they've been at school all week. They feel like I deserve to be able to play the video game on Saturdays. So I think the world itself has just made it harder for kids this day and age…."

"And I think a lot of it - the kids stay indoors with their games, what do you call it, Nintendos or Playstations or whatever it is. I just don't see them outside as much as I see them out here in this area or in your area."

Television

"When he's grounded, yeah, he just can't get it at all. But no I don't have to restrict it. Well during the week in my household we don't even turn on the TV at all. Like when we cook dinner, it's either music, but we're just always so busy we don't even really have time to sit down and watch the TV."

"It's one of the main reasons. It's convenience. They're there. The A/C's on. Nice TV. Mom get me a drink."

"They have the TVs. They have all the games. They just don't want to go outside. They're inside all the time."

Family time

"Probably a lot of kids over here probably don't have a lot of the technology.

They probably cannot afford Xbox and those games and all those things and the internet and stuff like that. And some of them don't speak English, so their parents are not going to buy those type of things. They'd rather do family type stuff, it's more family oriented."

Access due to limited age-appropriate programming

Some parent focus group participants shared their perception that there were social environmental barriers to PA among middle childhood youth related to limited programming at PA facilities in the East Austin community. Parents reported few programming options for middle childhood youth and there were no adults to supervise the pre-adolescents who came to the center for free-play. Additionally, parents reported the little programming that was available for their added child was costly. Some noted that the courts and fields were often occupied by adults. The parents shared their perceptions regarding this social environmental barrier to PA:

Access to middle childhood youth

"Well, we have a rec center here and every time I let him go, they're closed or they're doing a game."

" ... It's really big yeah, it's a really big basketball court and I don't understand why they can't use half for if they have a game night and the other half for the kids who just want to shoot around or get out of the house for a little while and go enjoy that because they upgraded it so nice and you can't ever use it. I told my son, 'What's the point of upgrading it if you can't use it?'"

"They have plenty of recreation centers around here. But as she was saying a lot of times they focus more on the organized sports, the organized teams and they don't open it up to the whole community. Therefore, the community kids just either find something else to do on their own or get just get lost in the shuffle. I think. That's my

opinion."

Age-appropriate access

"I take him to the park. I don't like to take him to the park because he's 13. You see a lot of babies at the park."

"The only one that's in my neighborhood is Gibbons Park and it's nothing but adults. There's basketball courts and there's always adults just out there. Adult men playing on the courts and probably drinking and smoking."

"So when we do take him on a Saturday or a Sunday to the Dove Springs Center, you can't because there's nothing but men. And I say men because now they're having kids at about 16, 15. So I'm saying, the parks are there, we're very grateful it's there. It has a playscape, everything you could have there, but you have a hard time trusting the center because they don't separate the age brackets, to say the least. I could go on a Saturday at 2 o'clock which you think is a good time for kids, and I'll see a bunch of 17 to 40 year old men playing basketball and the kids are just sitting there waiting for their turn. And I don't have a problem with people socializing and drinking, you know because everybody does their own thing. What I do have a problem with is when there's 17 and 18 year olds necking and doing all that. That's what I mean about age. The basketball is older men."

"Yeah you can't ever separate ages, but we go and there's kids under twenty feeling a girl off on the side. I hate that they do that and half of them are my culture that are doing it. It gets the kids attention. I work for the city and I work for Parks and Rec and I'm always telling them, y'all need to do something about the age guys."

Cost

"But there's the Christian Center. They have bowling, they have a movie theater

in there. Roller skating. They have that and on Fridays, it's overpriced but it's so packed, it's crazy. You're concentrating more for the kids to be careful for them to have fun. Forsafety. Because there are so many people and it's a rec center for kids but I would think there's more adults out there on the skating rink that what there is kids. Which I can understand an adult with a kid, but there's more adults like this and all up on each other and skating together then what there is."

"...some of this stuff is a little pricey. Even sometimes the YMCA - I think is a little pricey for people that have more than 1 kid, and you want all of them to be in some kind of activity, it comes out to quite a bit."

"And a lot of the programs there at (PANAM) you have to pay for. They have Karate, boxing, which you have to pay for. The only free thing they have is the gym, but whenever it's open."

"Sixty dollars for registration and then for a uniform."

"Yeah you can't ever separate ages, but we go and there's kids under twenty feeling a girl off on the side. I hate that they do that and half of them are my culture that are doing it. It gets the kids attention. I work for the city and I work for Parks and Rec and I'm always telling them, y'all need to do something about the age guys."

"So we were looking into like soccer zone, but it was just so far. And I know there's one here but it's expensive. Just for one, it was by levels, of what they know, if they're advanced and beginners, it was like over $200 just the registration.

STUDENT FOCUS GROUP RESULTS

As with the parent focus groups, the written transcripts of the three student focus groups were analyzed for expected and emergent dominant themes (Table 1). The

preliminary list of expected themes was created based upon the literature review and included: (1) *Traffic*; (2) *Crime*; (3) *Access to age-appropriate play space*; (4) *Parental restriction of independent mobility*; and (5) *Technology*. In addition to the expected themes, another dominant theme of student discussion emerged and was added to the analysis: *Family inactivity.*

Student-perceived environmental barriers to childhood PA

The students did perceive traffic as a potential built environmental barrier to PA in their East Austin neighborhoods. Additionally, students discussed their access to age-appropriate play space**,** including options at home, within walking distance and those too far to access independently. Social environmental barriers discussed, as well, including crime, parental restriction of independent mobility, the displacement of PA by the use of technology**,** and family inactivity.

Built environmental barriers discussed

Traffic

Although most students reported that they did walk and ride their bicycles in their respective neighborhoods, many had stories to share of bicycle accidents and speeding cars. Often when asked if...'there was something in their neighborhood that makes it hard for you to get out and be active and do things you want to do'..., "fast drivers" was the immediate reply. However, the students denied that their parents restricted their going outside because of the cars. Additional student statements from the focus groups revealed the students' perceptions that traffic does create a built environmental barrier to PA in middle childhood in East Austin:

"I got hit by a car (on my bike, on the street)."

"Oh, I wrecked my bike, too and I got a new one with rockets one it!"

: "... a friend who lives close to my house – and not next to the cars when the cars are crossing - pew-> pew <- pew-> (head motion moving back and forth indicating fast-moving cars)."

"There's a lot of cars over there that race. Like sometimes there's races."

"We're trying to cross the street and people are trying to race and kids are always trying to cross the street but you can't because of the cars."

Access to age-appropriate play spaces

Very few of the students reported they did not like to play outside. Most reported it was their favorite activity. The participants in the student focus groups did not appear to perceive limitations to their accessibility to age-appropriate play space as they reported many accessible options for their favorite forms of PA. They listed age-appropriate sports and games and when asked about where they go to play their favorite game or activity, they listed "in the street", backyard, front yard, friend's house, park, school and church playground. Most had several options within the independent travel distance limit set by their parent(s). However, one student did report being yelled at to leave the local gym but, in his view, the park wasn't appropriate for him because it was "a baby park". Some reported that parents went with them to more distant parks or to the bike trail. Many reported that parents proved transportation to the park. Still, the students did have a PA facility wish list for their neighborhoods. The wish for a larger or closer swimming pool was the most common wish; some wanted bigger parks and "more stuff to do at the park" including skateboarding, rock climbing, a track and exercise equipment. One student perceived the local pool as an age-inappropriate "baby pool". More specifically, the students shared these statements that shed light on their perceptions related to their access

to age-appropriate play space in their community:

Age-appropriate access

"(I play) in the park across the street."

"I live by a playground a little bit and sometimes I go and play (with my brother, we walk)."

"I have three parks in my neighborhood: there's one right by the pool and there's one in my backyard behind me and there's one just in one area."

"I just play at the playground. I live over there, so it's really easy to get there."

"One time I had a friend that couldn't hear or speak so I used sign language and we both were playing on a playground that we had (at the park) and we used to play tag and we used to go down slides and we had a little miniature rocket that was stuck onto the ground so we used to swing on that."

"(It's) like four or three miles. My mom drives me."

(I go to the pool with) "Both" (friends and family).

Access to middle childhood youth

"At the basketball court at my cousin's house. It's just down the street. I can ride my bike."

"Well, in my yard, me and my brother play soccer."

"(I bike) everyday to school."

"Yeah, it's right next to mine (her house) and like sometimes we go in the street and we play basketball and sometimes we play with my bikes."

Social environmental barriers discussed

Crime

The students spent little time in the discussion of crime, other than the

acknowledgment of the speeding cars. There was no mention of theft or concern of abduction or abuse. Still, their limited statements did hint at a perception of potential danger in their neighborhood and a possible risk to outdoor PA. Some statements recorded in the student focus groups reflected opinions expressed by parents, so it may be difficult to completely dissect student from parent perceptions:

"My neighbor throws trash in our backyard."

"Every time my neighbors go drink, when they get really, when they drink, they throw beer bottles at each other and one got into my room and almost, it got broken and almost hurt me. Glass really hurts."

"My dad thinks it's not safe to play outside."

Parental restriction of independent mobility

Most of the student participants spoke confidently of being able to play outside in their neighborhood, although one student reported the parents were often close by when playing outside. When asked what the students typically did when arriving home after school, approximately half of the responses included "play outside".

When asked if there were ever times their parents wouldn't let them play outside, the students responded:

"Because I either didn't do my chores or didn't clean my room."

"We need to do homework and it's really late or too dark."

"...because we did something wrong."

The limits of independent travel were highly variable, usually dependant upon the area of residence. Most of the students expressed a clear understanding of their individual parent-defined limit. Of those who reported a defined travel limit, this limit ranged from one block to five blocks. The students knew which facilities were within

walking distance, which ones they could access alone, and which ones required parent escort:

"(I run from) school to home, the park, front yard, neighborhood,"

"Not (on the trail) by ourselves."

"Yes. (A parent goes with us)"

Displacement of PA by technology

Although most of the student participants reported owning more than one type of electronic screen device, most of the audible statements indicated that technology usage was not the preferred activity. The students described house-bound activity as "boring" because "I only watch T.V." Still, every participant of one of the student focus groups reported having a television in their bedroom. The students' statements indicated regular technology usage that may serve as a social environmental barrier to their PA in a culture where childhood technology use appears to have become unrestricted. The list of thing to do for fun included: "Watch a movie." "Get on Face book. " Wii."

After school activities included:

"Watch T.V."

"I play my video games and do my homework."

"I play my video games and play with my dad."

"There's no rules for mine (television)."

"Whenever I want to watch it."

Family inactivity

Interestingly, the student discussion of after-school and evening activities led to discussions of family time. Despite evidence of student interest in all things electronic, the student focus group transcripts not only speak to a strong preference for outdoor

activity, but also a desire to spend more time in outdoor family PA. One participant indicated a preference to play with family and when the focus group was asked if it would be more fun playing with friends or their whole family the response was "My family". Students reported they often tried to convince their parents to come outside for PA, but the adults rarely came out to play. One student reported they were now too old to play outside. Other students shared their stories and experiences, along with some creative strategies for encouraging their family to come outside and play, including a family reunion or a game of kickball. Here are some of their stories:

"My mom is busy, but not my dad. He plays with me and he plays soccer, too."

"Because I say 'Can we go play?' and they say 'No, I'm tired'. I do nothing. I just play video games and they just sleep. I play a racecar video game."

"Yeah. My mom's just resting when I'm watching (the television), you know."

"By tricking them: something out there that's awesome! Come see it! Come see it! And then lock them out."

"... persuade them. To tell them how fun it is riding their bikes, riding around getting crazy and sweating."

COMPARATIVE ANALYSIS OF PARENT AND STUDENT PERCEPTIONS

The creation of the Environmental Barriers Thematic Conceptual Matrix (Table 4.2) provides further order to the qualitative focus group data (Miles & Huberman, 1994). This technique allows additional analyses, such as making contrasts and comparisons. The ordered display helps to illuminate the similarities and differences between the parent and student perceptions as expressed in the focus group discussions.

For example, both parents and students discussed traffic and perceived it as a

danger and barrier to student travel, impacting both walking and bicycling to access and achieve PA. The parents verbalized many specific causes of the increase in risk to pedestrians, including the four-way stops, distracted drivers and speeding cars, while the students verbalized a simpler understanding: speeding cars. Also, the students seemed to perceive less danger, overall. There is concordance in their perception with subtle variations in perspective. Both perceive a built environmental barrier.

In contrast, parents expressed extreme concern related to crime, especially stranger abduction. They verbalize a perception of extreme risk requiring constant vigilance, restricted activity and limited independent travel in order to protect their child. The students, on the other hand, had little to say about crime, except for a story about trash and another about a neighbor drinking. They did not verbalize concerns about restricting activity, nor did they support the parents report of severe restriction and limited freedom. Instead, some reported independent travel of several blocks. It is difficult to determine if concordance exists or if the discordance is in the expressed perception of the parent and the report of the student. It is likely that this perception is highly variable dependent upon the neighborhood of residence. It is possible that as the students are gaining independence, they are not following the rules the parents have set. It is also possible that the parents wish to say what they perceive as the correct response. Concordance is difficult to determine.

When asked about favorite childhood activities other than PA, both parents and students quickly acknowledged the students' frequent use of technology. Parents and students, alike, reported it was common and both seemed to perceive the unrestricted use of television and video games as inconsequential. The parents did not express a perception that the students were using the devices inappropriately, although some

parents did identify the electronic devices as competition for outdoor play. Both appeared to demonstrate a cultural view that technology was provided to most children, in spite of the expense and was not restricted. Some students perceived the technology use was encouraged by the parent to allow the parent some quiet time in the evening. Still, both perceive technology as a competitor with PA in middle childhood in their community, therefore, there is concordance.

The students reported many opportunities to access PA near their home, and seemed content with the free-play space available. They reported play options at home, school, friend's homes and more. Many of the students reported more than one park within walking distance of their home. The parents reported that there was not enough age-appropriate programming for middle childhood-aged youth at area parks and PA sites and the cost was prohibitive. They perceived that their students often found facilities at the local recreation center occupied by adults and teens. However, few student participants verbalized that perception in the focus groups. Regarding PA programming at the local PA sites, there appears discordance in the parent and student perception that it is an environmental barrier to middle childhood PA in East Austin.

Most of the parents reported strict supervision and restriction of the student's movement. Some described not letting the student out of their sight or out of the yard. None described independent travel limits of several blocks or more. In contrast, the students described playing in the street, walking independently to the park, traveling alone one to five blocks away, and riding their bicycles in the street, on the sidewalk and in the parking lots. The parents and students appear to have discordant perceptions.

Lastly, the students spoke passionately about the desire to be more physically active with their families and shared stories about the enjoyment of playing with their

parents. They reported that it has been very difficult to convince parents to come outside to play. Family outdoor activities were reported as rare, although some described their fathers as playful. Some students described being encouraged to play video games or watch television when asking parents to play. The parents, on the other hand, did not address family play or family PA events in the focus groups discussions. Instead, they often spoke of sending their student out to play or arranging for the student to get some exercise through a planned program or team activity. The parents did not have the opportunity to address this question.

In summary, Study 1 demonstrates both concordance and discordance in parent-student perceptions concerning social and built environmental barriers to PA among middle childhood youth in East Austin. There is concordance concerning traffic, crime (possibly) and technology as barriers to PA among this population. However, perceptions differ related to the impact of limited access and availability due to programming, parental restriction, and family inactivity.

Barrier	Parent-perceived	Youth-perceived	Contrast between parent and youth
Traffic	**Yes**	**Yes**	**Students less concerned**
Crime	**Yes**	**Yes**	**Students less concerned** **Parents extremely fearful**
Technology	**Yes**	**Yes**	**Both report use** **Neither perceive as problem** **Youth say parents promote** **Youth request family PA**
Programming	**Yes**		**Not expressed by students** **Parent concerns $, access, age-appropriate opportunity**
Access	**Yes**		**Students do not perceive** **Parents perceive access barriers due to program, crime, traffic**
Parent restriction	**Yes**		**Parents report restriction due to crime and traffic** **Students deny parent restriction**
Family inactivity		**Yes**	**Parents did not address** **Cultural? "Too old to play"**

Table 4.2 Environmental Barriers Thematic Conceptual Matrix comparing parent and student perceptions

Study 2: Objective Environmental Assessment

SPATIAL ANALYSIS AND OBJECTIVE OBSERVATION

Five East Austin residential neighborhoods were selected for additional analyses of the built and social environmental barriers to PA impacting middle childhood-aged students residing in five varied areas of a lower socioeconomic urban community. The five residential neighborhoods selected were chosen from those represented by the Study 1 focus group parent-student participants from all five East Austin zip codes. Table 4.3 demonstrates the lower socioeconomic status of East Austin. While the median household income in Austin is $55,744, the median household income of those residing at East Austin zip codes ranges from $29,809 to $41,176. Additionally, more than twice as many residents earn less than a poverty level wage (www,city-data.com).

	AUSTIN	TEXAS	78702	78721	78722	78723	78741
Estimated median household income 2010	55,744	49,585	35,839	29,809	36,422	41,176	33,488
% Residents with income below 2010 poverty level	13.4%	16.9%	33.3%	32.9%	17.2%	30.5%	38.3%
% Residents with income below 50% of 2010 poverty level	5.9%	10.1%	20.0%	18.8%	7.5%	14.1%	19.1%

Table 4.3: Comparison of median household incomes and poverty rates for each of the five East Austin zip codes, the city of Austin and the state of Texas (www.city-data.com)

The street corner of the block on which each family resides served as the center of a one-half mile area of study where built and social environmental barriers were explored using GIS maps. Additionally, nearby age-appropriate PA sites were selected for systematic objective observation using an expanded SOPARC observation tool (Mc Kenzie et al., 2006; Bocarro, et al., 2009).

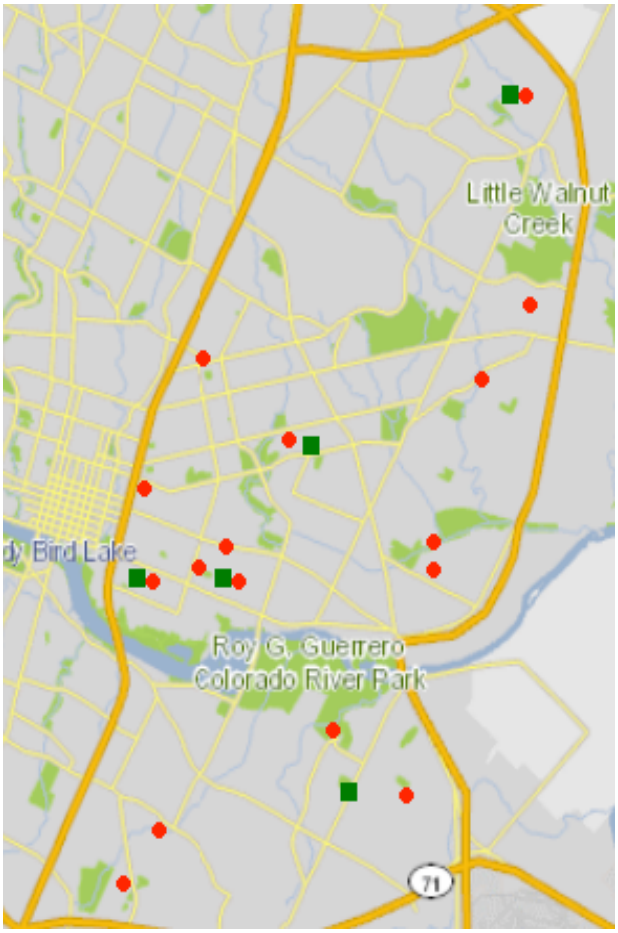

Figure 4.1: Map of East Austin Study Sites. Dots indicate the Study 1 neighborhoods. Squares indicate Study 2 neighborhood sites (www.ci.austin.tx.us)

Site 1: 2000 East Sixth Street at Robert E. Martinez, Zip Code 78702

The residences in the 2000 block of East Sixth Street near Robert Martinez are primarily apartment complexes located on a busy urban street. Much of this area facing Sixth Street has recently been rebuilt, yet many of the properties nearby are older commercial properties, poorly maintained warehouse-style structures separated by a functional railroad system. There are parks and green spaces to the north and south of the multi-family residential complex; however, there are notable built environmental barriers to access, particularly for students traveling alone. As noted in Figure 4.2, in order to access the green spaces to the north, students would be required to cross busy Seventh Street. Likewise, to access green space to the south, including the nearest PA site, Pan American Park and Recreation Center at Chicon and Third Street, would require crossing the railroad tracks. Also, of note, some of the buildings between Sixth Street and Pan American Park are in disrepair and there is evidence of public blight: graffiti, trash, overgrown vegetation, and unoccupied property. These, along with the increased population density, would be expected to increase the crime risk. Table 4.5 lists the incidents occurring within the area, for which criminal reports were filed during the month of May, 2012. The report includes one report of assault and three possible drug violations. There are no sexual assaults or abductions reported (www.ci.austin.tx.us). However, the 2010 assault rate is twice that of the other study recreational sites. Figure 4.2 also demonstrates the traffic danger in the area. It is possible to travel to the park without crossing a high traffic street as indicated by the shaded streets.

A systematic observation was completed at Pan American Park using SOPARC System of Observing Play and Recreation in Communities (McKenzie, 2002) which had been expanded to separate children by age group, specifically designed to identify those

in middle childhood. This is summarized in Table 4.4. The park is located at Chicon Street between East Third Street and East Fourth Street. The facilities included a large grassy park area; a play area with playscape slide, tables, and benches; an outdoor theater that was fenced and locked; a baseball field that was fenced and locked; and tennis courts that were fenced and locked. The area was not supervised and no portable sports equipment was available. The observation days were clear and calm with temperatures between 84 and 91° F. It was noted that the park was on the school bus route during the weekday observations. All who entered the target area were counted.

Day, Time	People	Age Group				Ethnicity				Activity Level		
		EC	MC	Teen	Adult	L	B	W	O	S	W	V
1, 4:30-6:00P	Female	4	4		8	12	2	2		7	8	1
2, 4:30-6:00P		2	1	2	3	6		2		4	4	
3, 11:00A-1:00P			1		1	2					2	
4, 11:00A-1:00P			2		1	1		2			3	
1, 4:30-6:00P	Male	2	4		13	15	2	2		7	10	2
2, 4:30-6:00P		2			4	5		1		2	4	
3, 11:00A-1:00P				3	2	3		2		2	1	2
4, 11:00A-1:00P				3	5	4		4			5	3
	Totals	10	12	8	37	48	4	15		22	37	8

Table 4.4 Pan American Park Observation, SOPARC-Expanded.

Additional observations:

Day 1, 4:30-6:00PM: Adult men walked through the park to Pan American Recreation Center (wearing basketball shorts); MC with skateboards waiting; adult women walking to parking area (wearing shorts); EC playing; others standing. School buses were observed.

Day 2, 4:30-6:00PM: People waiting or walking through the park in route. School buses were observed.

Day 3, 11:00-1:00: 84º Teens and one adult ran through the park with dogs.

Day 4, 11:00-1:00: Adults played at the park; family played in the playscape.

Participants arrived by car, bicycle, skateboard and some walked. None were observed arriving by bus. None were seen walking from the school nearby.

The Pan American Recreation Center Schedule for Spring/Summer 2012 indicated afterschool programming was offered for 5-12 year olds at a cost of $100 per month. The group was not observed at the park during the scheduled observations. Spring Break programs were listed for 5-11 year olds at a cost of $90 per week. Summer camps were offered at $75 per week and sport participation cost was listed at $20- $25 per child per sport or $300 per team. There were several free evening programs advertised for teens on various topics and teens over the age of 18 could sign up to use the weight room for $15 per month. Also, adults had a regular pick-up basketball game scheduled in the late afternoon and adult Zumba class was on the schedule on Monday and Wednesday at 4:30 PM. The printed materials indicated the center is available for rental and on one of the weekend (Saturday) observation days, the indoor facility was unavailable as it had been rented by a local karate business.

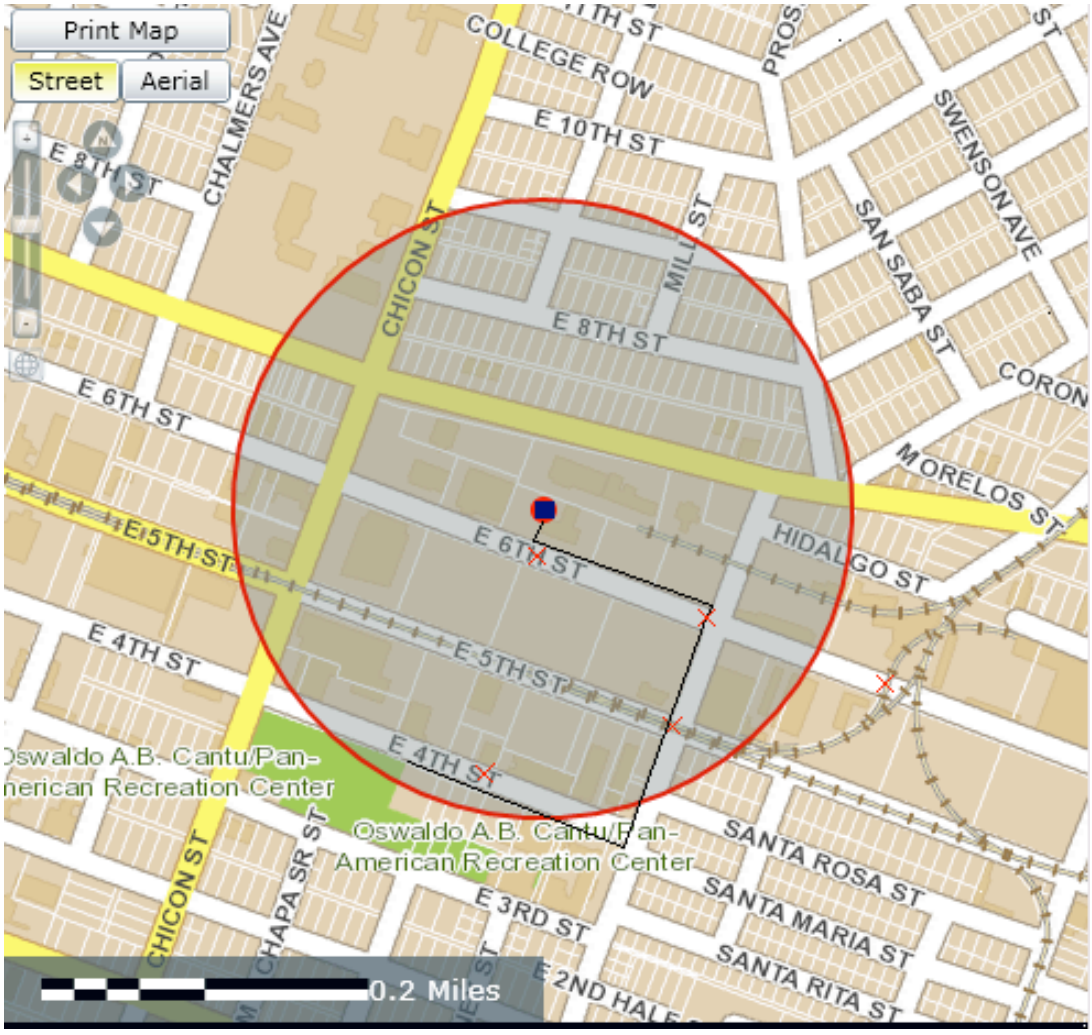

Figure 4.2: Site 1 Barriers to independent travel and access to PA for middle childhood youth. The square is the block of residence. The green shaded area is a PA site. X indicates barriers. Shaded streets are heavily traveled. (www.ci.austin.tx.us).

	Crime Description
2	ABANDONED VEH
1	ASSAULT WITH INJURY
1	ASSIST COMPLAINANT
7	BURGLARY OF VEHICLE
1	CRIMINAL MISCHIEF
1	CRIMINAL TRESPASS
2	CUSTODY ARREST TRAFFIC WARR
1	DISTURBANCE - OTHER
2	DRIVING WHILE LICENSE INVALID
2	DWI
1	FOUND PROPERTY
1	FRAUD - OTHER
1	GRAFFITI
1	LOST PROP
1	POSS CONTROLLED SUB/NARCOTIC
1	POSS CONTROLLED SUB/SYN NARC
1	POSS MARIJUANA

Table 4.5: Site 1 Thirty day crime report for 1000 foot diameter area surrounding site 1. 2010 Assault rate=19-36 (www.ci.austin.tx.us)

Site 2: 100 Navasota Street at Cesar Chavez Street, Zip Code 78702

The corner of Navasota Street and East Cesar Chavez Street is the center of the area of study identified as Site 2 and shown in Figure 4-3. Site 2 is a lower socioeconomic area with both single family homes and small family-owned businesses intertwined together. There are a few newly constructed homes, as the neighborhood is

gaining popularity for its proximity to downtown Austin. But, for the most part, the structures are several decades old, many dating back to the 1930's. Despite the urban address, and an Interstate-35 neighbor, there are many green spaces, parks and open green lots suitable for play. Surprisingly, there are few built environmental barriers between the block of residence and the area parks, including Sanchez School Park at Holly Street and Waller Street as illustrated in Figure 4.3. There are fenced family yards, but few commercial fenced areas. There are no railroad tracks, rivers or creeks. Interstate-35 borders the area, but travel across it would not be necessary to access PA sites. In fact, close inspection of Figure 4.3 reveals it is possible for a child to walk down Navasota Street to Taylor, traveling on sidewalks through residential areas without crossing a major thoroughfare, and cross Waller at a crosswalk to access Sanchez School Park. The thirty day crime history (Table 4.7) included two reports of assault, 2 reports of theft, two reports of burglary and three possible drug incidents. Clearly, there are some busy streets in the area including E. Cesar Chavez Street, and Second Street as indicated on Figures 4.3, but it would not be necessary for the student to cross either in order to access Sanchez School Park from the block of residence in this study.

A systematic objective observation was completed at Sanchez Park and the summary is reported as Table 4.6. There was a lot of pedestrian and bicycle traffic outside of the park, including mothers with strollers. The park facilities were noted to include a multiuse field, a covered basketball court, a playscape suitable for early childhood students, a playscape suitable for middle childhood students, swings, a fitness circuit, running track, picnic tables, pet waste bags and benches. All facilities were accessible. There were no staff members or leaders present. No equipment was available. The sky was partly cloudy with temperatures of 81-88^{o} and no wind. All who entered the

targeted area were counted.

Day, Time	People	Age Group				Ethnicity				Activity Level		
	Participants	EC	MC	Teen	Adult	L	B	W	O	S	W	V
1,4:30-6:00P	Female				1			1			1	
2,4:30-6:00P												
3,11:00A-1:00P		1			2	3					3	
4,11:00A-1:00P					1	1					1	
1,4:30-6:00P	Male		2		2	1		3		1	2	1
2,4:30-6:00P				2		2						2
3,11:00A-1:00P					2			2		1	1	
4,11:00A-1:00P												
	Totals	1	2	2	8	7	0	6		2	8	3

Table 4.6 Sanchez School Park Observation, SOPARC – Expanded.

Additional observations:

Day 1, 4:30-6:00PM: One adult used the fitness circuit; mother & 2 boys ate fast food.

Day 2, 4:30-6:00PM: Two teens played basketball.

Day 3, 11:00-1:00: Adults stood with a child at playscape; adults ran through the park.

Day 4, 11:00-1:00: One adult walked through the park in route elsewhere.

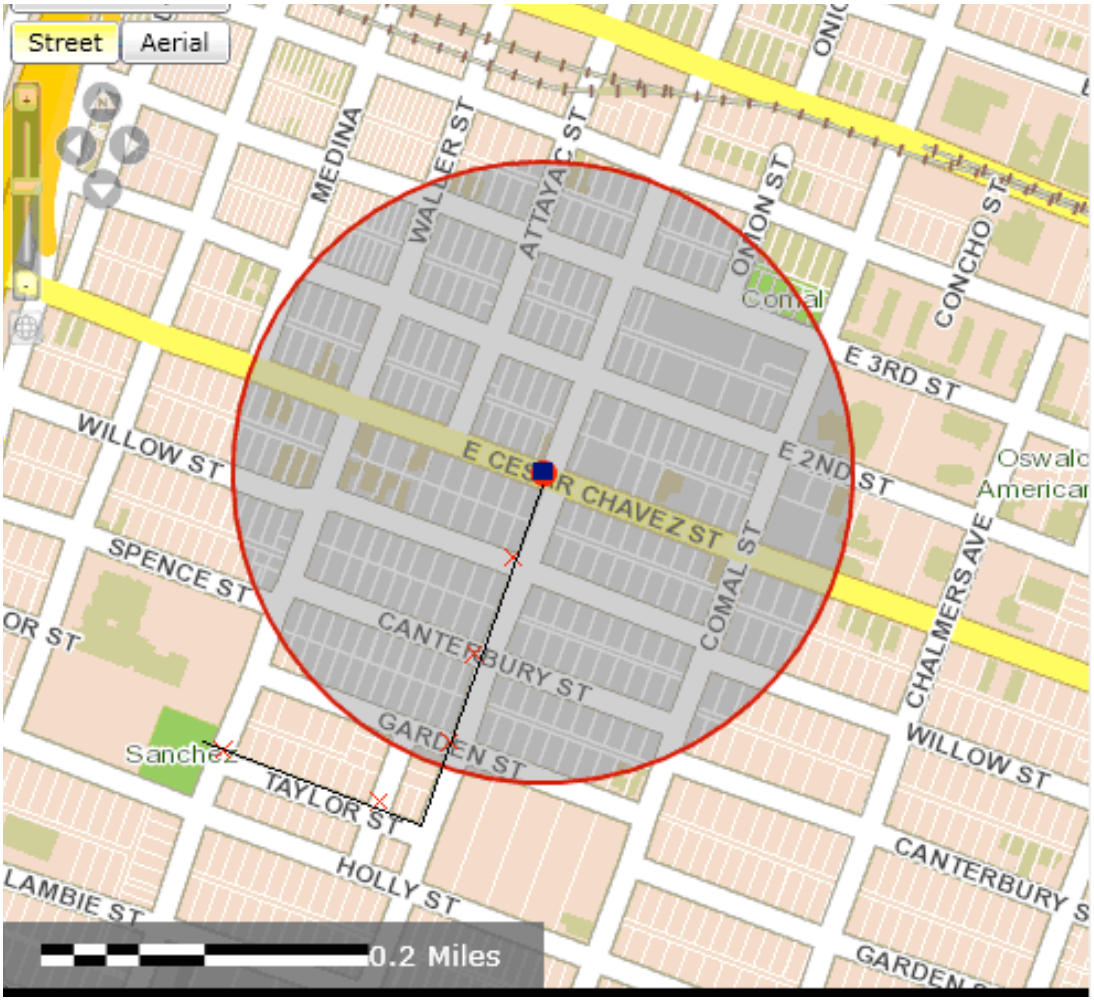

Figure 4.3: Site 2, Barriers to independent travel and access to PA for middle childhood youth. The square is the block of residence. The green shaded area indicate PA sites. X indicates barrier. Shaded streets are heavily traveled. (www.ci.austin.tx.us).

	Crime Description
2	AGG ASSAULT
1	ALCOHOL CONSUMPTION VIOLATION
1	AUTO THEFT
2	BURGLARY NON RESIDENCE
2	BURGLARY OF VEHICLE
1	CRIMINAL MISCHIEF
2	CUSTODY ARREST TRAFFIC WARR
1	DISTURBANCE - OTHER
1	DRIVING WHILE LICENSE INVALID
5	FAMILY DISTURBANCE
1	FAMILY DISTURBANCE/PARENTAL
2	LEAVING THE SCENE CRASH/ACCIDE
2	POSS CONTROLLED SUB/NARCOTIC
1	POSS MARIJUANA
2	PUBLIC INTOXICATION
2	THEFT
3	WARRANT ARREST NON TRAFFIC

Table 4.7: Site 2 Thirty day crime report. 2010 Assault rate N. of Caesar Chavez=19-36, S= 1-18 (www.ci.austin.tx.us)

Site 3: Dubuque Lane at Loyola Lane, Zip Code 78723

Site 3 is located in the northern part of East Austin in the University Hills residential area just inside a loop of multileveled highway created by Highway 183. This area has a large African-American population. The center of this area of study has some large single family homes creating a built environment with a lower population density than much of East Austin. In addition to the yard space, there are parks and green belt

areas allowing for walk and bike trails as shown in Figure 4.4. Just down the street from the residential block is the Dottie Jordan Community Center. Figure 4.4 illustrates the distance between the residential block and the community center is approximately three blocks. There is a sidewalk on one side on Dubuque Lane and both sides on Loyola Lane. Access would require crossing Loyola Lane. There is both a crosswalk and a bus stop at the community center and the area is open with good visibility. There were no identifiable built environmental barriers and no heavily traveled streets, as noted in Figure 4.4, and none were noted during the observation. The crime report (Table 4.9) for May of 2012 lists burglary, theft and fraud. There were no abuse or abduction reports listed.

A systematic objective observation was completed at the Dottie Jordan Community Center at 2803 Loyola Lane and is summarized in Table 4.8. The facilities were noted to include a small community center for meetings and senior activities such as card playing; outdoor facilities included a (closed) swimming pool, playscapes for preschool and elementary, uncovered basketball court, unlocked tennis courts, walk/bike trail, and a large grassy park area with picnic tables. All facilities were accessible. Staff was available to help and supervise outdoor activities. Sports equipment, including balls, was available. Students could come after school without registering or paying. The observation days were clear, 79-90º and calm. City and school buses were observed stopping at the community center. All who entered the targeted area were counted.

Day, time	People	Age Group				Ethnicity				Activity Level		
	Participants	EC	MC	Teen	Adult	L	B	W	O	S	W	V
1,4:30-6:00P	Female	3	7	4	5	6	11	2		4	9	6
2,11:00A-1:00P			1		6	1	5	1		2	4	1
3,11:00A-1:00P		3	5	1	8	8	3	6		1	12	4
4,4:30-6:00P		4	3		8	5	8	2		1	10	4
1,4:30-6:00P	Male	3	12	6	3	6	16	2		2	8	14
2,11:00A-1:00P			2	1	15	3	12	3		3	2	13
3,11:00A-1:00P		2	1	2	11	4	8	4		2	10	4
4,4:30-6:00P		5	9	4	16	6	22	6		3	23	8
	Total	20	40	18	72	39	85	26		18	78	54

Table 4.8 Dottie Jordan Community Center Observation, SOPARC- Expanded.

Additional observations:

Day 1, 4:30-6:00PM: Children in active play after school; lots of basketball.

Day 2, 11:00-1:00: Children and teens played basketball; men played tennis.

Day 3, 11:00-1:00: Families played at playscape.

Day 4, 4:30-6:00PM:

The basketball court was in constant use on each observation day. There was an outdoor staff person available to facilitate activity, be watchful, and help maintain cooperation. Participants arrived by Austin City metro, school bus, car and bicycle, as well as on foot.

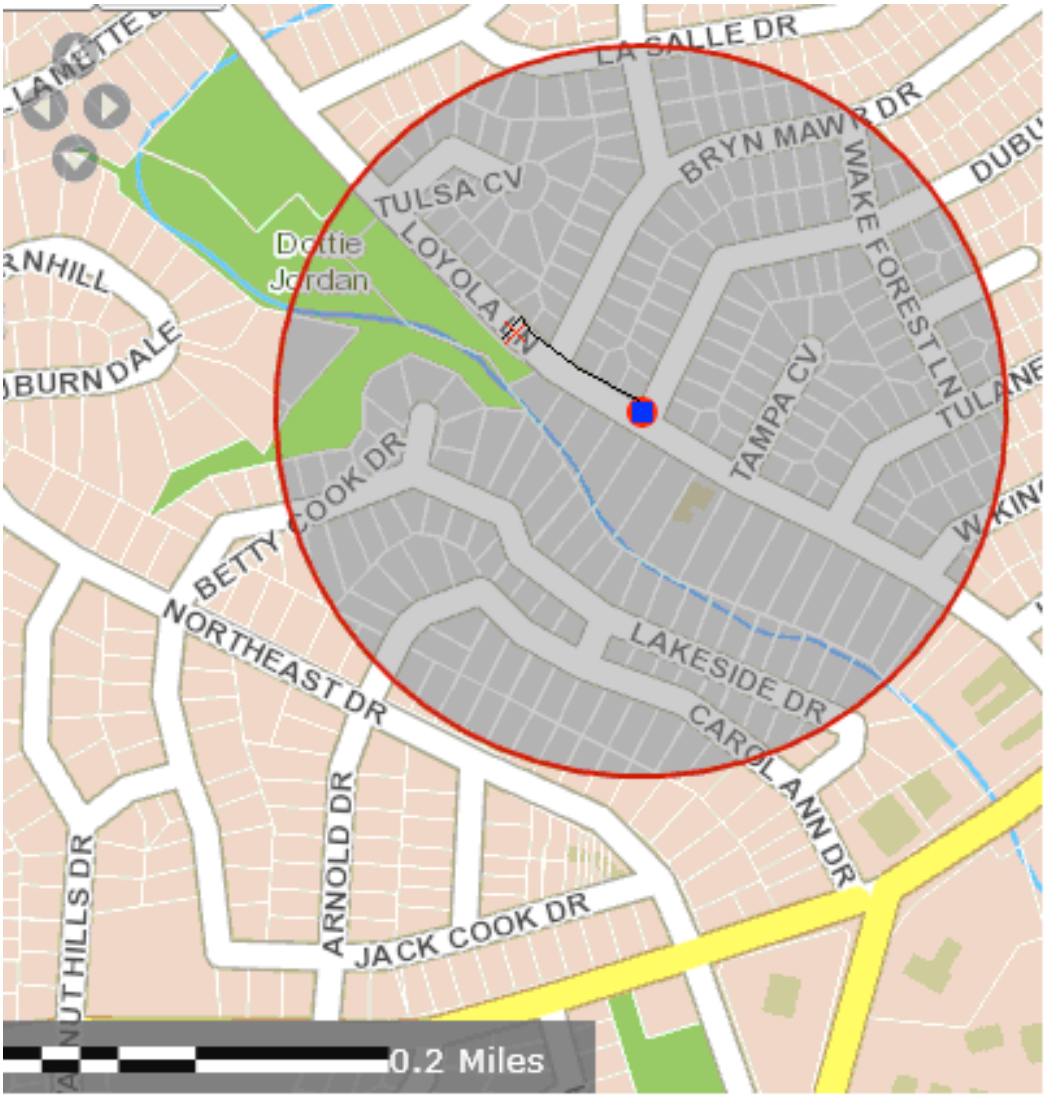

Figure 4.4: Site 3 Barriers to independent travel and access to PA for middle childhood youth. The square locates the block of residence. The green shade area locates PA site. X locates barriers. Shaded streets are heavily traveled. (www.ci.austin.tx.us).

	Crime Description
1	BURGLARY NON RESIDENCE
1	BURGLARY OF RESIDENCE
2	FRAUD - OTHER
1	HARASSMENT
1	JUNKED/NUISANCE VEHICLE
1	LEAVING THE SCENE CRASH/ACCIDE
1	THEFT

Table 4.9: Site 3 Thirty day crime report. 2010 Assault rate=1-18. (www.ci.austin.tx.us)

Site 4: Frontera Lane at Montana Street, Zip Code 78741

Site 4 is located in the southeastern corner of East Austin in the Montopolis community. This area of Austin is near Austin Bergstrom Airport and contains some industrial and city service areas. As seen in Figure 4.5, there are large open areas of land. The center of this residential block is an area of newer construction with lower to lower-middle socioeconomic single family dwellings. There are play spaces available, as well as parks and sport fields with easy access and many sidewalks. Likewise, there are few barriers between the neighborhood center and the Montopolis Practice fields (Figure 4.5).

Finally, the 30 day crime report shows there was some criminal activity reported within the site 4 study area, including one episode each of assault, burglary and harassment (Table 4.10).

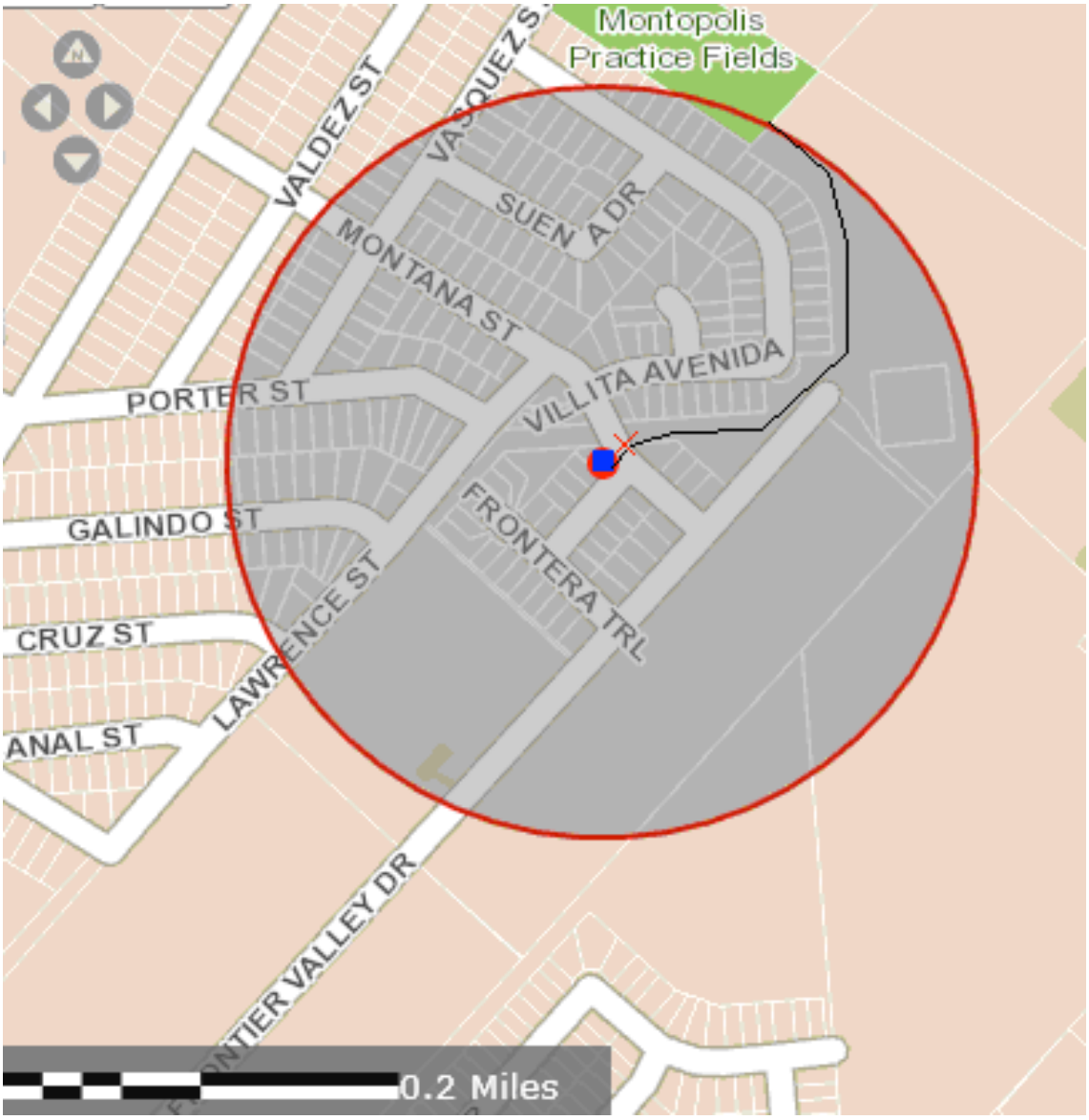

Figure 4.5: Site 4 Barriers to independent travel and access to PA for middle childhood youth. The square locates the block of residence. The green shaded area locates the PA site. X locates barriers, which is a street crossing. (www.ci.austin.tx.us).

	Crime Description
1	ASSAULT W/INJURY-FAM/DATE VIOL
1	BURGLARY OF VEHICLE
1	CRIMINAL MISCHIEF
1	CUSTODY ARREST TRAFFIC WARR
1	DRIVING WHILE LICENSE INVALID
1	FAMILY DISTURBANCE
1	HARASSMENT

Table 4.10: Site 4 Thirty day crime report. 2010 Assault rate=1-18 (www.ci.austin.tx.us)

Site 5: 900 Bedford, Zip Code 78722

Site 5 is located in central East Austin in the Rosewood community. The residential complex that serves as the center of this area of study is a large, relatively new federally-assisted housing. There are play spaces available, as well as near-by parks and sports fields and the school across the street has a covered basketball court, track and large open playing field (Figures 4.6). There are few built environmental barriers between

the neighborhood center and the school playground but more as one heads toward the other recreational sites in the area. Pedestrian or bicycle travel can be accomplished without leaving the residential complex until it becomes necessary to cross Webberville Road. The traffic danger map indicates that there is some danger there based upon the accident history (Figure 4.6). However, there are two cross-walks there, as well. It appears to be a less hazardous route than traveling to the parks and recreational sites to the north. This would require crossing Rosewood Street, which is shaded on the map because of the high volume of traffic. Also, there are some railroad tracks to the northwest. The area does have a higher crime rate and the thirty day crime report list is longer at site 5 than at any other site of study. The list includes multiple assaults, theft, burglary (Table 4.12).

A systematic objective observation was completed at the Oak Springs Elementary School and is summarized in Table 4.11. The facilities included a playscape with swings, a covered basketball court, a large grassy open field area, picnic tables and a gravel walking track. There were no fences or gates and all facilities were open and accessible. There was no staff or supervision and no equipment was provided. The observation days were clear, 75-90º F and calm. All who entered the targeted area were counted.

Day, Time	People	Age Group				Ethnicity				Activity Level		
	Participants	EC	MC	Teen	Adult	L	B	W	O	S	W	V
1,4:30-6:00P	Female	1		1	3	3	2			1	4	
2,4:30-6:00P			1			1						1
3,11:00A-1:00P												
4,11:00A-1:00P		1		2	3	5		1			5	1
1,4:30-6:00P	Male	2		4	5	6	5			2	8	1
2,4:30-6:00P				2		2					2	
3,11:00A-1:00P					2	1		1		2		
4,11:00A-1:00P		2	1	1	2	6					4	2
	Totals	6	2	10	15	24	7	2		5	23	5

Table 4.11: Oak Springs Elementary School
System for Observing Play and Recreation in Communities – Expanded

Observations:

Day 1: 4:30-6:00PM – Two EC boys played with their grandfather, three teens played basketball, most adults walked through area in route elsewhere.

Day 2: 4:30-6:00PM – One MC female played at playground, teens passed through.

Day 3: 11:00-1:00 – Workers from road construction stopped at the bench to eat lunch.

Day 4: 11:00-1:00 – Men played basketball, one EC female played vigorously with an EC male, one MC male walking & waiting, one female teen played with a handheld videogame, two women walked.

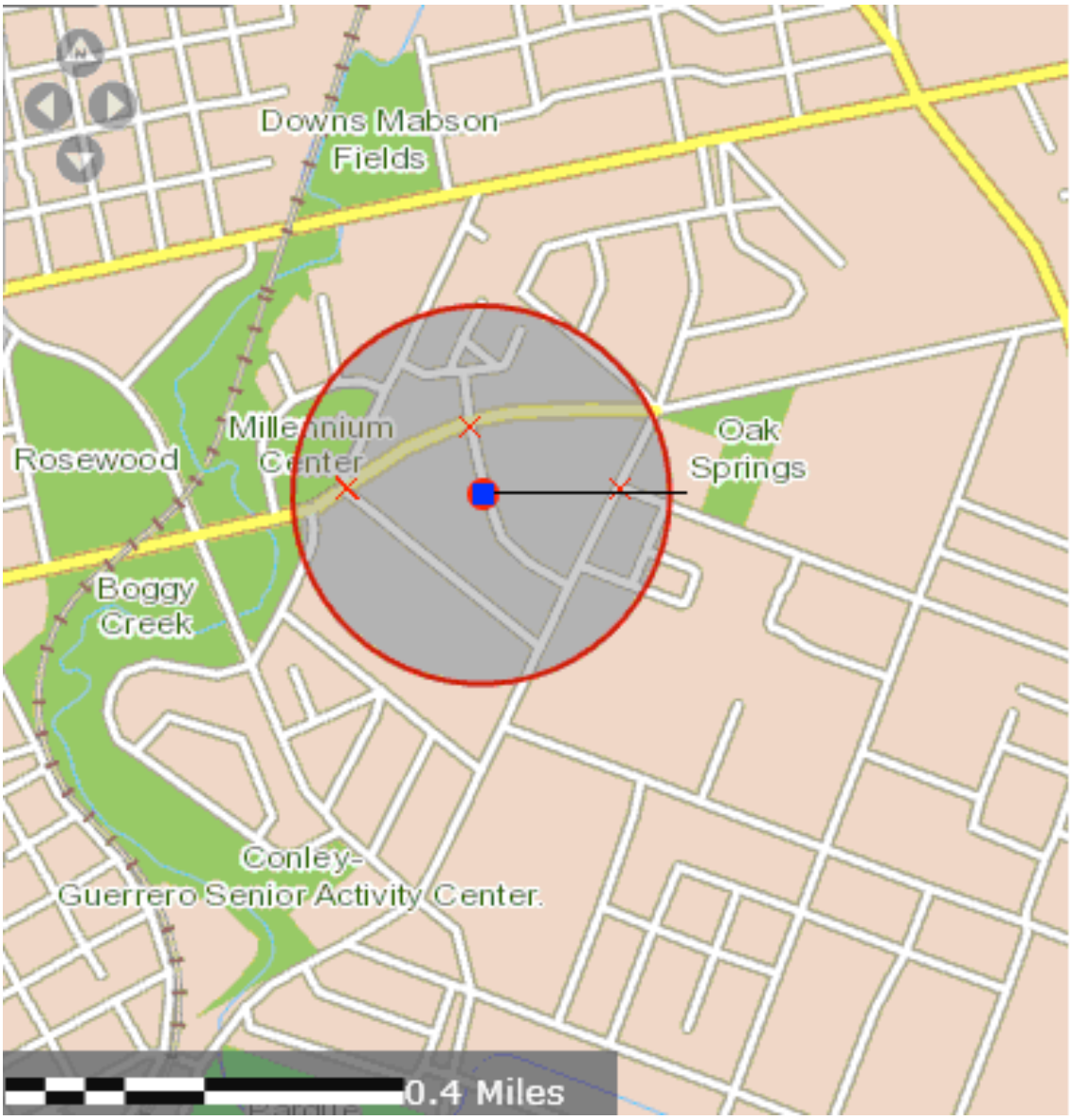

Figure 4.6: Site 5 Barriers to independent travel and access to PA for middle childhood youth. The square locates the block of residence. The green shaded area locates the PA site. X locates barriers. Shaded streets indicate heavy traffic. (www.ci.austin.tx.us).

	Crime Description
1	AGG ASSAULT FAM/DATE VIOLENCE
2	ASSAULT W/INJURY-FAM/DATE VIOL
1	ASSAULT WITH INJURY
1	AUTO THEFT
1	BURGLARY NON RESIDENCE
1	BURGLARY OF VEHICLE
1	CRIMINAL MISCHIEF
3	CRIMINAL TRESPASS NOTICE
1	DATING DISTURBANCE
5	DISTURBANCE - OTHER
1	DOC DISPLAY FIREARM-PUB PLACE
3	DOC FIGHTING
1	EVADING / FOOT
1	FALSE ALARM OR REPORT
4	FAMILY DISTURBANCE
1	FICTITIOUS LICENSE PLATE
2	FOUND CONTROLLED SUBSTANCE

Table 4.12: Site 5 Thirty day crime report. 2010 Assault rate=1-18 (www.ci.austin.tx.us)

The Environmental Barriers Thematic Conceptual Matrix: A Comparison of Parent Perceptions, Student Perceptions and Objective Findings, Table 4.13, summarizes the findings of Study 1 and Study 2 by organizing the perceptions of parents and youth and the objective assessment findings into a thematic conceptual matrix (Miles & Huberman, 1994) in order to facilitate the comparison between the three. The table demonstrates the concordance between youth and objective assessments and the variable discordance and concordance between parental perception and objective assessment.

Barrier	Parent	Student	Objective
Traffic	Yes	Yes	Manageable for age
Crime	Yes	Yes	Yes, but not what parents fear Unlikely impacting MC PA
Technology	Yes	Yes	Objective phase did not examine
Programming	Yes $, leadership		$, programs offered, leadership
Access	Yes Programming Crime Traffic		Programming related Restriction related
Parent restriction	Yes Crime Traffic		Children are at the PA sites if there is low cost supervision
Family inactivity		Yes	Objective phase did not examine

Table 4.13 Environmental Barriers Thematic Conceptual Matrix: A Comparison of Parent Perceptions, Student Perceptions and Objective Assessment

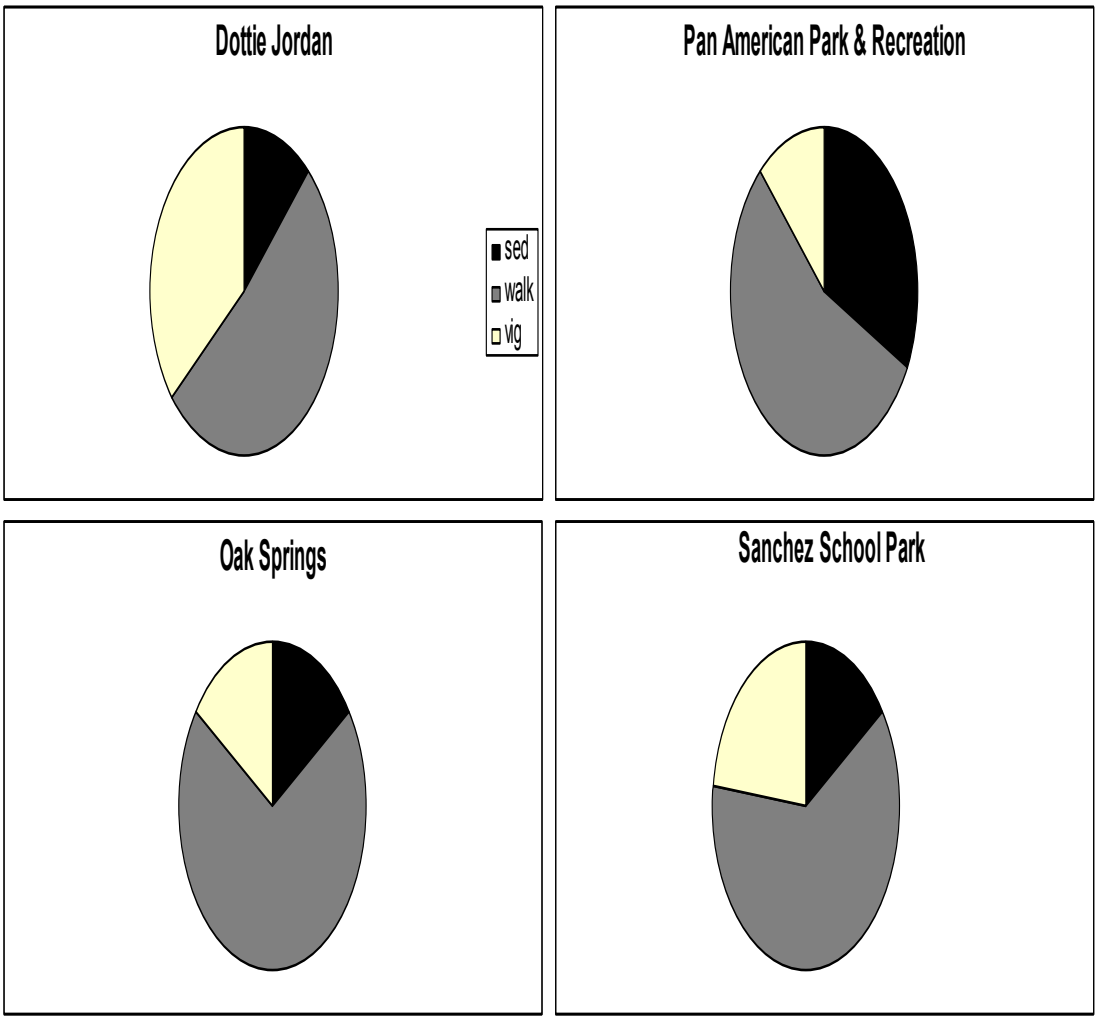

Figure 4.7: Comparison of Participant PA Intensity at the PA Study Sites

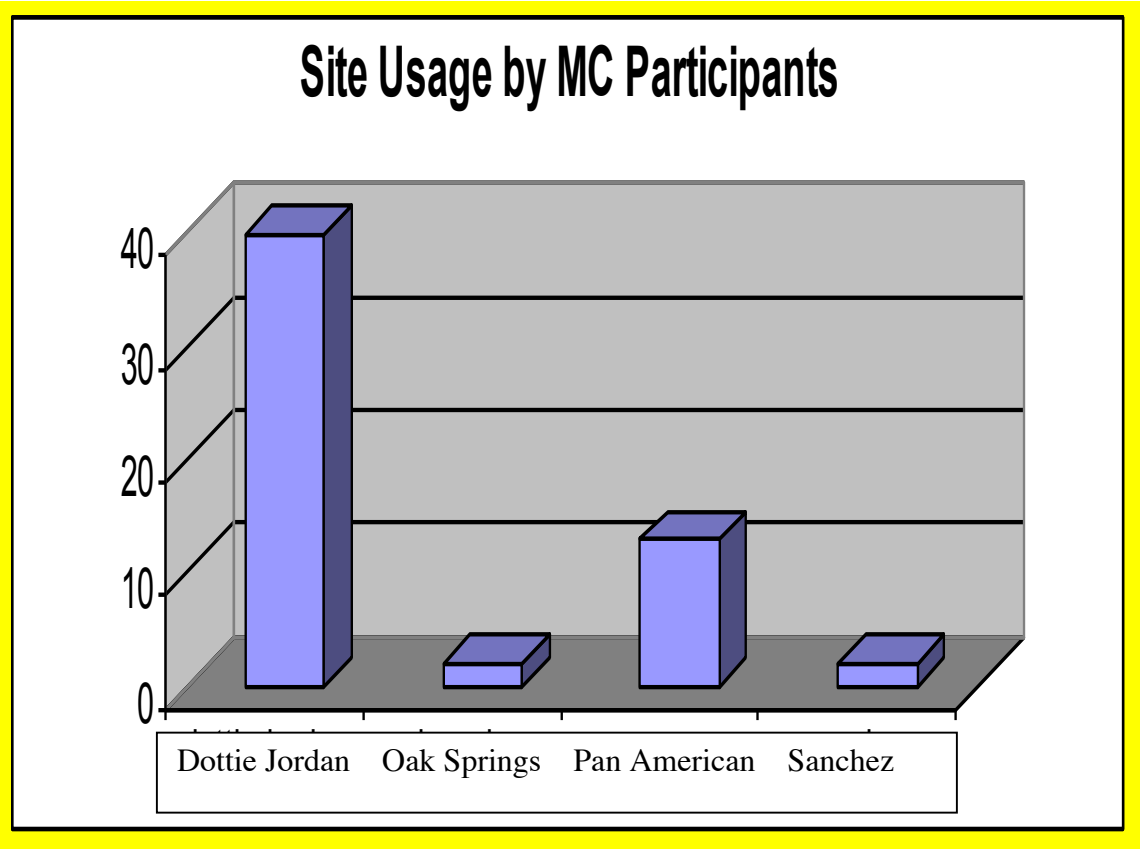

Figure 4.8: Middle Childhood site usage

The objective systematic observation data revealed that the sites were accessible but few participants utilized the PA sites during the observation periods. Inter-observer reliability for age, gender and activity was 100%. Inter-observer reliability for ethnicity was 97%. Most of the observed participants were determined to be adults. Few observed participants engaged in vigorous activity. A larger percentage of participants utilized Dottie Jordan Community Center and a larger percentage were observed to be vigorously active (Figure 4.7). Also, Dottie Jordan was used by more middle childhood-aged participants than any other PA site among those included in the systematic observation

(Figure 4.8). Up to 20 times as many MC youth visited the Dottie Jordan Community Center during the observation periods as the other sites.

CHAPTER 5: DISCUSSION

A precipitous decline in PA begins in middle childhood and continues through adolescence and adulthood. It is suspected to be the result of many influences, including the environment. However, these influences are poorly understood. Physical activity behaviors in adults have been found to be strongly influenced by the environment (Humpel, Owen, & Leslie, 2002; Parks et al., 2003), and decades of research have strengthened our understanding of the environmental moderators of PA in this population. More recently, researchers have begun to explore the influence of the built and social environment on adolescent PA. Millstein and colleagues (2011) reported that the environmental factors of home, school, and neighborhood explained 15.8% of the variance in adolescent PA. In many ways, the built environmental needs of the adolescent have been found to resemble those of the adult, although the social environmental needs are distinctly different.

Middle childhood youth, however, do not share the transportation styles and destinations of adolescents and adults. Likewise, the health needs of middle childhood are different from those of adolescence and early childhood, and middle childhood is developmentally distinct. Unfortunately, there is a paucity of published literature on the impact of the built and social environmental barriers moderating PA behavior in middle childhood. Much of what has been published is based upon parental perception and report. The middle childhood youth perspective has not been elicited, and few objective observations have been recorded in natural community environments. This is problematic as the concordance of parent- and youth-perceptions has not been established. Nor, has either of these been compared to objective assessments.

This dissertation was designed to extend current knowledge regarding environmental barriers to PA among middle childhood youth residing in a low income, minority, urban community by examining those barriers as perceived by the youth, as perceived by their parents and as measured by a systematic objective assessment and to compare the concordance of those assessments.

A Theoretical Perspective

The Social Ecological Model for children depicts the child as a small inner circle surrounded by sequential circles of influence, including the parent, then the family, the community and geopolitical influence, with the additional influences of school and peers placed laterally. As Sameroff (2010) described in the Unified Theory of Development, it is not appropriate to apply this model uniformly to children of all ages. Instead, the interaction between each of these levels will vary as a function of the child's developmental stage and their growing independence. Thus the level of influence for each stage reflects a changing position within the family and community. For example, as the child ages, the inner circle depicting "self" enlarges as the youth is gaining independence. Self becomes a greater influence while the influence of parents and others diminishes. In middle childhood, youth become more independent in their interaction with their environment, in particular, as they begin to formulate goal-directed behavior. This dissertation examined these three levels of influence, assessing environmental barriers to middle childhood PA as perceived by parents, their middle childhood-aged children and those identified by objective measures, as well as the concordance between those assessments.

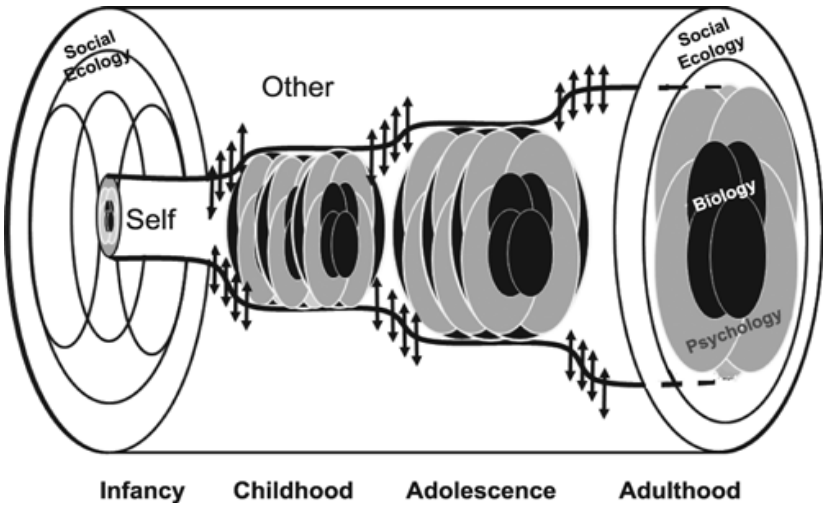

Figure 2.2 A Unified Theory of Development (Sameroff, 2010)

The results of the dissertation will be organized through the major themes derived from Study 1 for both parents and children: (1) Traffic and Crime; (2) Technology and (3) Access and Programming. Following this, I will present the limitations of this work and the implications for future directions.

TRAFFIC AND CRIME

Adult responses. The parents participating in the Study 1 focus groups perceived roadway traffic as a built environmental barrier. They also perceived crime, particularly the risk of stranger assault or abduction, as a social environmental barrier to PA for their middle childhood youth. The parents reported responding to these fears by protectively restricting the outdoor activity and independent travel of their child. Specifically, they were fearful that the traffic danger would result in pedestrian and cycling accidents. As a result, the parents reported that they had instituted walking and cycling restrictions.

Because these are the youth's primary forms of independent transportation, these restrictions are also likely to inhibit the youth's independent access to PA sites and their activity.

The results of the Study 1 focus group analysis support the findings of Carver and associates (2010) who reported that a parental perception of risk resulted in a responsive set of restrictive behaviors that were associated with a reduction in childhood PA. Additionally, it has been reported that parents of all SES groups appear to be growing increasingly fearful of harm to their children by strangers (Carver et al., 2010; Timperio et al., 2004). These restrictions have been reported to predict additional consequences that hinder not only the PA of youth but also their normal social development and, potentially, prevent the establishment of a positive feeling toward the community (Prezza and Pacilla, 2007). This negative perception, in turn, appears to perpetuate reduced PA in adolescence as youth who feel unsafe in their neighborhood report less PA.

Youth responses. A somewhat different pattern was reported in the youth focus groups. Although the youth verbally acknowledged the cars and heavy traffic, they appeared less concerned about both than did their parents. Further, the children insisted it did not inhibit their independent movement or PA. They could think of other places to go and other alternatives for PA. While their perspective may reflect a naive awareness of danger, it appears that the youth perceptions may actually be the stronger determinant of youth behavior, especially as they get older and become more independent. This finding supports what has previously been reported in the literature. Slater et al., (2010) reported that youth perceptions of safety were positively associated with youth PA, irrespective of objective evidence.

Additionally, the youth appeared to perceive no parental restriction or limited

access to PA sites. The youth reported many available and easily accessible options for PA. The only discussion of parental restriction was of being required to finish homework or chores before going outside to play. Most youth reported independent travel distances of one to five blocks. The only caution they reported from parents was to "watch out for the cars". Interestingly, the youth perception of independent travel distance was not concordant with the parent-perceived independent travel distance reported for their child. However, the upper limit of five blocks reported by the youth was less than, but very close to the 800 meter (approximately one-half mile) limit of independent travel reported by Timperio et al., (2004) as typical for middle childhood-aged youth.

Comparison to objective measures. Although discordance between parental perceptions and the objective assessment of the environment was hypothesized, the results were mixed. Parents identified traffic and crime as impactful built and social environmental barriers to middle childhood PA in their community. They also reported restricting middle childhood youth activity in order to keep them safe.

Traffic was a parent-perceived environmental barrier to youth PA that – when assessed objectively - appeared to be manageable at most of the neighborhood study sites. The objective assessments did indicate some high-traffic streets, but there were often several PA sites from which to choose and alternate, low traffic routes were options. Only one of the four study sites revealed multiple traffic barriers from several directions. Thus, despite parent concerns, 3 of the 4 sites had sufficient access to physical activity options without having to navigate extensive traffic.

With regard to crime, the objective data assessed reports of crime in the last 30 days. Many of the reported crimes, such as fraud, abandoned vehicle, and family disturbance, are not typical of stranger crime directed at youth (Finkelhor et al., 2009).

Interestingly, the reported crimes in the area are not the ones the parents expressed as creating barriers to the independent travel of middle childhood youth. Parents perceived a risk of abduction and were fearful of abuse by the many registered sex offenders. Yet, no abductions were found in the reported crime data for the previous 6 months (www.ci.austin.tx.us). In addition, assaults were a very small number of the reported crimes. Thus, their concerns appear largely unfounded. This is not surprising. Finkelhor and Ormrod (2000) reported that objective data reveal, despite parental fear of strangers, that children are more likely to be abducted, assaulted or sexually abused by family members. Thus, although a source of parental anxiety, there is little evidence that these crimes are a concern in this area.

It is unclear why the parent and youth perceptions concerning the parental restriction were so clearly discordant. Considering Sameroff's theory, there may be a natural struggle between the parents and youth: the parents are setting limits and the youth are pushing their independence by not adhering to those limits. Also among the possibilities: the parents or the youth are untruthful in their response. Perhaps the parents' response demonstrates a yield to social pressure in the collection of data, believing they should report restrictive behavior because that is what is expected. However, there was no attempt to actually track children's physical activity through objective measures. As a result, it is not clear if they were active, which leaves open the possibility that they were over-estimating their outdoor activity.

Objective measures were used to better understand the concordance of youth-perceived and parent-perceived barriers to middle childhood PA in the built and social environment. This was the primary purpose of the study, as stated in the first sentence of the introduction. As hypothesized, the objective assessment supported the youth

perception. Thus, it appears the youth have demonstrated the accuracy of their self-reported knowledge of the natural world in which they live. More importantly, this implies that the youth are, indeed, out and about in the community.

The demonstration of concordance of the youth perception with the objective measures of environmental barriers to middle childhood PA may represent a critical finding potentially altering future assessment strategies to include self-report from middle childhood youth. It suggests that middle childhood youth may be a reliable data source to inform a better understanding of the moderators of PA in middle childhood. This knowledge may help reduce the precipitous decline in PA that has been noted in middle childhood and continues through adulthood.

TECHNOLOGY

The parent participants perceived technology, including hand-held and stationary video games, television and computer games, as activities in competition with childhood PA. This is not surprising, as Rideout and colleagues (2010) found that children eight to ten years old typically view 3.75 hours of television per day. As such, these forms of technology would be considered social environmental barriers to PA. However, it is unclear whether the parents perceived it as a problem. Technology was not discussed with the same passion and concern regarding traffic and crime. Also, solutions were not sought to prevent the use of technology. Parents did not seek to control or restrict use of technology as they did the exposure to traffic and crime. In addition, their view was discordant from their children who perceived their parents as promoting its use. This finding is consistent with the literature, which reveals that parents promote screen time, rather than monitor it or attempt to restrict. Rideout et al. (2010) reported few parents of 8 to 18 year olds enforce television viewing limits, and many parents provide bedroom

television sets for their children. Parental monitoring of technology may be especially important during middle childhood, when youth are developing independence and beginning to make decisions concerning behavior, (Jellinek, Patel, & Froehle, 2002).

Technology was also reported by the middle childhood youth to displace PA. Most reported unlimited access to television and many had televisions in their bedroom; including all of the participants in one focus group. Television viewing and video game playing were frequent after-school activities. Increased technology use among youth is well-established. In 2010, the 2007 Youth Risk Behavior Surveillance Survey results indicated that 24 % of youth reported 3 hours of daily computer use and one third reported 3 hours of television viewing per day (CDC, 2010). Thus, children and adults were in concordance in their perception regarding the impact of technology as a barrier to physical activity.

Interestingly, the youth of this study verbalized the perception that technology use in the home served as a barrier to PA by interfering with family activity, rather than competing with individual PA or PA in general as it is discussed in the literature. Thus, without time spent watching TV children felt that parents would be more available for outdoor play. This is a unique perspective demonstrated by the youth in this study. While positive associations between maternal and paternal modeling of PA and child PA have been reported, as has parental co-participation in the promotion of childhood PA (Crawford, 2010), family participation, in particular, has not been explored as a moderator of childhood PA.

The middle childhood youth in this sample were clear to say that they prefer family time in PA outdoors rather than spend it indoors with technology. Yet, their perception is that the parents prefer the youth use technology. Theoretically, the problem

may be due to a mismatch of youth need and parental support. Sameroff (2010) demonstrates this period of development as one of increasing independence and decreasing influence of parents. Yet, the youth of middle childhood are still very much in need of parenting. In the area of technology use, the literature provides evidence that parents may have ceased to parent, failing to provide appropriate guidance and necessary limits (Jellinek et al., 2002; Rideout et al., 2010). Based upon the literature and the findings of this study, there may be value in the development of health interventions for parents of middle childhood youth on healthful parenting, particularly in the areas of family PA and family media usage.

ACCESS AND PROGRAMMING

The availability and access to neighborhood play space is reported to be a critical determinant of PA in childhood (Humbert et al., 2006). This is problematic as the literature speaks of green space being lost as urban development transforms outdoor child space into indoor living space (Karsten, 2005). While the parents reported similar concerns, the youth participants reported access to multiple PA sites, activities and travel options. Interesting, it is the view of youth participants – not the parents - that were highly concordant with the objective assessment. Specifically, the objective assessment revealed many accessible outdoor play spaces in four of the five study site neighborhoods. All of the neighborhoods studied had at least one accessible park and every school yard was unlocked and accessible, although equipment was not, typically available. While the availability of outdoor play space does not guarantee youth PA, it is

necessary for outdoor play and has been reported to correlate with increased youth PA (Epstein et al., 2006).

Many parents perceived a lack of programming for middle childhood-aged youth as a social environmental barrier to PA. They reported there was less available for the middle-childhood aged youth than teens or adults at the local PA sites. Many also perceived that the cost of programs and sports for the middle childhood-aged youth was prohibitive and the lack of supervision prevented free-play use of the courts, parks and fields. This was largely supported in the objective analysis, with only one of the sites offering programming specific to middle childhood.

The literature supports both the parents and the objective data collection. Identified barriers related to limited PA options for children include unavailable facilities and a lack of equipment (Durant et al., 2009; Sallis et al., 2001), particularly locked school yards and stored school equipment. Access to PA sites has been reported to be poor in lower SES and minority neighborhoods (Gordon-Larsen et al., 2006). However, while available green space has become more adult-focused (Karsten, 2005), preferential PA programming for adults and teens has not been examined, nor reported in the existing literature. The paucity of developmentally appropriate programming for middle childhood youth, distinct from younger children, has also not been previously examined. Both of these offer fertile options for future research.

It was hypothesized that the objective measures would demonstrate programming heavily supportive of adult participants. The systematic objective assessment and the

parental perception supported this expectation. Specifically:

1) limited specific programming for middle childhood-aged youth: most middle childhood youth programming was the same as that for early childhood and resembled day-care or after-school care;
2) the cost was higher than teen programming which was often free;
3) and there was often competition by adult programming for facilities and equipment, even in the after-school hours.

Interestingly, the site where staff and equipment were available for free after-school free-play outdoors was the one where more middle childhood-aged children were consistently found These children were also observed to be more physically active and more vigorously active than in other locations. Thus, programming appears to be a critical predictor of middle childhood youth.

As described by Sameroff (2010), youth have different needs as they grow, develop, become more independent and the influence of self grows larger. Also important to note, Sameroff's theory depicts the parent or parent-figure and community influence as gradually getting smaller, but still present. The PA programming needs of the middle childhood youth are not the same as the younger child, nor are they the same as the teen. The ten or twelve year old middle childhood youth may not need a day-care-like setting at the recreation center or park, but s(he) may need enough supervision to access equipment and help settle an argument, as the success of the supervised free-play site demonstrates. While these results may represent a new finding, it is important to note that this research was exploratory in nature and intended to identify potential environmental barriers based upon the perception of middle childhood youth and their parents.

Summary

In summary, the findings of this study support the findings of previous researchers who have identified road traffic, crime, and parental support of technology as environmental barriers to middle childhood youth PA. The most cited concern in the literature, limited outdoor play space, was not identified as a barrier in East Austin. Instead, multiple outdoor PA spaces were available at four of five study sites in the systematic objective observation sample. Interestingly, this was accurately perceived by children, but not by adults. This suggests the need for educational interventions for adults to increase utilization of the existing resources. Also, this study extends current knowledge of environmental barriers to middle childhood PA by identifying additional potential environmental barriers to PA in the urban minority lower SES community of East Austin. These include: limited developmentally appropriate PA programming for middle childhood youth, including supervised free-play, available equipment and low-cost pre-teen options Additionally, as youth-perceived environmental barriers to middle childhood PA were consistently concordant with objective measures, youth perceptions regarding their experience within their environment may prove to be reliable sources for further study. In contrast, parental environmental reports may be less reliable.

Limitations

These studies are limited in several ways. First, the focus group samples were small and self-selected. The self-selection may have resulted in a biased sample of more interested or community-invested families. This is not expected to have affected the validity of the results, but to have produced a thoughtful assessment by the participants. The goal was to achieve a sample was representative of the targeted minority population

of a specific urban community. Given the spread of the families throughout the targeted neighborhood, I am confident that this was achieved. Unfortunately, this study was also limited by the failure to assess child and family descriptive data, e.g. body composition; levels of activity; income; etc. While data is reported from the average in each data collection site, it is impossible to specifically describe the sample. There is also the possibility that the selected sites were not reflective of low SES areas. However, a summary of census data supported this designation. Specifically, while the median household income of Austin, Texas was reported to be $ 55,744, the median household incomes of the five zip codes of the area studied ranged from $29,809 to $41,176. And although 17% of Texans live below the poverty line, 30.5% of East Austin residents earn incomes below the 2010 poverty level and 16% live below the 50th percentile of the 2010 poverty level. Thus, although not definitive, the existing data suggest that this dissertation reasonably achieved a representative sample of the East Austin community.

Ethnographic analysis created a potential for researcher bias, although every attempt was made to be faithful to the truthfulness of the data. Likewise, the use of investigator observation created the risk of researcher bias in the recording and interpretation of observational data. To limit this possibility, the validated SOPARC protocol and training were used to standardize systematic observational data collection, but the concern remains. Spatial analysis and geographical information system data accuracy was beyond the control of the researcher as GIS was gathered from Austin Police Department sources.

A more substantial limitation is the failure to directly assess children's physical activity. The parents indicated strong restriction on outside play, while children indicated that they regularly played outside. With the exception of one location, the objective

assessment of the largest outdoor play within each site did not find a large number of active children. This would appear to support their parental view, but I did not assess other outdoor areas of play (e.g. in streets; friends yards; empty lots; etc.). Thus, it is impossible to assess the nature of the discordance between the child and adult participants.

This study was intended to be exploratory in nature and to identify potential environmental barriers based upon the perceptions of middle childhood youth, those of their parents and objective data. Neither definitive conclusions nor causality are inferred by the results of the ethnographic or observational data. Thus, while key limitations exist, the resulting data offer much to guide both future research and intervention design.

Future Directions

As this study was exploratory, additional research is needed to further investigate the identified environmental barriers. In particular, recreational site programming for middle childhood-aged youth and the potential of family PA as a moderator of childhood PA may be worthy of further study. Additional research is needed to assess and better understand family media use and its consequences upon family members in middle childhood, as well as other developmental stages.

Additionally, further study is needed to examine the PA barriers to middle childhood PA more completely, with a specific focus on moderators such as gender, disability, body composition, cultural diversity and sport participation. That is, it may be that girls are more restricted, or self-restrictive, than are boys; or that sport replaces other outdoor play. Culture, as well as gender, may influence PA, as one youth focus group participant implied with her perception that she was now too old to play. It also may be

that overweight children restrict their activity more than lean children, although it has been reported that PA has decreased for all children over the last two decades (CDC, 2011).

In addition to qualitative studies, which allow a better understanding of the lived experience of the youth, quantitative, objective assessments are needed to better understand middle childhood play and PA. Global Positioning Systems devices (GPS) have been used with some success to track the location of study participants within the environment (Krenn et al., 2011). The GPS devices are best paired with accelerometers to monitor PA duration and intensity, as well. This may clarify the question arising in the objective assessment reported here where the youth reported PA, parents reported restricted activity, the objective assessment indicated the youth were knowledgeable of the environment, yet there were few middle childhood youth actually counted during the systematic observation of the PA sites.

Likewise, studies examining the urban environment and its impact on the PA behaviors of citizens of all ages are needed, because rarely are communities built for adults only. The continued promotion of a healthful active lifestyle, for youth, adults, schools, businesses and communities is needed to encourage a healthful social and built environment with few PA barriers for everyone in community. Government and private foundations must be encouraged to extend their research energy and recommendations beyond the working adult population. There have been encouraging changes in recent years. For the first time, the Healthy People 2020 goals include specific goals for Early Childhood youth and Middle Childhood youth (US Department of Health and Human Services, 2010).

Additionally, engineered research solutions are needed to protect pedestrians and cyclists from the dangers inherent to urban life including motorized traffic. For example, traffic-calming programs have been demonstrated to improve safety for pedestrians and bicyclists. Traffic-calming has been reported as relatively inexpensive as speed bumps are considered a finite solution after being purchased and placed. Also, they appear to be universally effective, regardless of SES (Jones, Lyons, John, & Palmer, 2005).

For now, the results of this preliminary, exploratory inquiry offer several findings worthy of further question and discussion. It was interesting that the perceived barriers reported by middle childhood-aged youth were highly concordant with the objective assessment, while the parent perceptions were less so. These findings may have implications for the collection and use of data from youth. Future research should directly compare responses of parents and children with objective assessment. These could be applied across outcomes (physical activity, diet, television viewing, etc.) to determine is accuracy differs across behavior. Likewise, it is important to compare across different aged children as the concordance between children and adults may vary with age. Very young children are more closely monitored and thus parents are likely to be quite accurate. In contrast, older adolescents are far less monitored – reducing parent accuracy. This, again, highlights the importance of separating analyses for middle childhood youth who are in a period of transition toward independence.

The theory informing this research, The Unified Theory of Development by Sameroff (2010), demonstrates that human development cannot be separated from the context of the social and built environment of the developing child. The figure illustrating the theory depicts the growing influence of the child shown as a center circle progressively enlarging at each stage. However, the study findings demonstrated that the

PA programming needs of middle childhood were highly specific and distinct from those of both early childhood and adolescence. This may inform reconsideration of the theory which does not distinguish middle childhood from early childhood. Lastly, the study results present several opportunities for pediatric clinical anticipatory guidance, preventive health care, intervention, child advocacy and change in the built environmental.

IMPLICATIONS FOR ASSESSMENT

The concept that "perception determines behavior", irrespective of the actual condition, is familiar to every student of health behavior or psychology. One of the earliest health theory models was an effort to explain health behavior based upon a perception of threat to health (Hochbaum, 1958). Historic research examining the impact of stress on health long ago demonstrated both physiologic and psychological responses to a perceived danger (Canon, 1932; Selye, 1956). Subsequently, research in both natural and social sciences demonstrated that discordance between perception and objective assessment was not an infrequent occurrence. As a result of these studies, it became generally accepted that although perception and objective measures are often discordant, it is perception that determines behavior.

In the study of environmental barriers to PA, the bulk of scientific knowledge is based upon studies in adult populations. Interestingly, these studies found that self-reported perceptions rarely matched objective measures. Discordance was reported between perception and objective measures related to accessibility, safety and distance to PA sites. It would, therefore, not be surprising to find, as this study did, that the perceptions of parents were discordant with some objective measures. An interesting contrast to this was the concordance between the youth-perceived barriers and the

objective measures. Concordance of parent and youth perceptions with objective measures of environmental barriers to PA in middle childhood has not been previously examined or reported.

It has long been accepted, although unsupported by scientific evidence, that youth are unreliable sources of information. As a result, parents have often been the source of targeted information related to youth. Large cross-sectional surveys typically rely on the parent's report for younger children (CDC, 2012). As was demonstrated in the literature review, most assessments of environmental barriers to youth PA relied upon objective assessment or parental report. See Davison and Lawson (2006) for a review. However, this study found that the perceptions of the middle childhood youth regarding barriers to middle childhood PA were strongly concordant with objective assessments while the perceptions of the parents were variably discordant and concordant.

As hypothesized, the concordance between youth-perceived environmental barriers to middle childhood PA and the objective assessment was strong. The youth were aware of traffic and crime, but denied that traffic or crime prevented their independent travel. They perceived multiple PA sites, activities and travel options within walking distance. These perceptions were concordant with the objective findings. It is likely that the middle childhood-aged youth spend more actual time in their respective neighborhoods than their parents and are, as a result, more knowledgeable than their parents about the PA options. This concordance of youth perception and objective assessment was also reported in the recently published comparison of parent-perceived monitoring of television usage and youth perception of parent monitoring. When parents and their elementary-aged children were asked about parental monitoring of television viewing in the home, parent estimates of monitoring were higher than the child estimates.

The child estimates proved to be the better predictor (Gentile, Nathanson, Rasmussen, Reimer, & Walsh, 2012). If this can be bourn out in future PA research, it would suggest that the middle childhood-aged youth are reliable sources of self-report data when addressing a lived experience.

This would have important implications and offer support for the reassessment of the current practice of the assessment and monitoring of youth populations. Rarely does a study design include data collection from youth under the age of 12 years. Instead, parent report has been considered more reliable. Additionally, much of the youth population surveillance data is obtained from adolescent youth surveys and parent report. For example, The Youth Behavioral Risk Surveillance Survey, an established measure of youth behavior, surveys high school students in grades 9-12. Likewise, the CDC uses the National Health and Nutrition Examination Survey (NHANES) to monitor the health and nutritional status of adults and children with a cross-sectional survey and physical examination. However, self-report data is completed by participants over the age of 16 years. Parents are asked to complete the survey for participants under the age of 16 years. As a result, there is little self-report data available regarding middle childhood youth. Yet, there appears to be growing evidence that the perceptions of middle childhood youth may prove a valuable untapped data source.

IMPLICATIONS FOR THEORY

Sameroff's Unified Theory of Development (2010) demonstrates that as an individual ages, grows and develops the influence of self increases and, concomitantly, the influence of others, including parents and community, decreases. His figure illustrates this transition as a series of four stages progressing from infancy through childhood, adolescence and adulthood. It is interesting that this is depicted as distinct stages rather

than a continuous drift of influence. As a result, early childhood and middle childhood are not distinguishable in the figure, just as the stages of adolescence and adulthood are not.

The present findings indicated that the PA programming needs of the middle childhood youth appear to be distinct from those of early childhood and adolescence. Parents recognized the inappropriateness of combining the middle childhood youth with adolescents for PA activities due to the extreme difference in development. Parents also complained that the same day-care-style program offered for early childhood youth were not needed for their middle childhood-aged children. Despite this, the parents also recognized that these children also required at least minimal supervision of free play as well as limited age-range exposure. This maps nicely onto the need to modify the Unified Theory of Development to specifically isolate this time of middle childhood as a period of transition that balances the expanded independence of adolescents with the need for supervision in early childhood. The programming needs described by the parents were found at one PA study site during the systematic objective observation. Not surprisingly, more middle childhood-aged youth were found participating at this site than at any other site. Also, more site users were noted to be walking or vigorously active where the programming offered supervised free-play and equipment.

There is additional evidence that the developmental stage of *middle childhood* is distinct from *early childhood* and *adolescence*. Erik Erikson described middle childhood as a stage of "industry" when new life skills related to building relationships are developing. It is critical to youth well-being that middle childhood offers the opportunity to develop these social relationships within the family, school and community, allowing youth to enter adolescence feeling secure and caring about themselves and others (Masten

& Coatsworth, 1998). As Prezza and Pacilla (2007) reported, youth who were able to play freely in their community at age 8-10 expressed positive feelings of connectedness and safety as adolescents. Failure to achieve this growing positive independence has been linked to poor self-concept and an increased risk of depressive symptoms and behavior disorders (Seligman, 1995). It is also during middle childhood that youth begin to internalize concepts of identity, framing who they are and creating goals of who they would like to become (Jellinek et al., 2002). Middle childhood is unique in these developmental tasks. Its importance is becoming clear. Perhaps it's time to focus additional attention on middle childhood by distinguishing it from early childhood and adolescence in developmental theory to better inform prevention and intervention.

Sameroff's Unified Theory of Development (2010) illustrates the stages of development progressing from infant to childhood to adolescence to adulthood with the center circle depicting self enlarging at each stage. Instead, the figure might be elongated to demonstrate the more continuous nature of the developmental process. As such, this might be best represented as a cone inside the cylinder, rather than the step-wise enlarging self at each stage as is currently seen. The cone would better demonstrate the gradual change in self in relation to other influences throughout life. Also, it is interesting that late-adulthood isn't depicted by a decreasing size in the center self core as the influence of self would be expected to diminish again with growing dependence on family and community. Finally, it seems the surface of the cone might be irregular, rather than smooth, mirroring the struggle and lack of consistency in change demonstrated in the study, as the influence of self in relation to the others in the Social Ecological Model is in constant transition. The revised figure is shown in Figure 5.1.

The Revised Model of The Unified Theory of Development is a departure from Sameroff's (2010) Unified Theory of Development in three fundamental ways. It differentiates Middle Childhood from Early Childhood in order to highlight the importance of this developmental stage and its development tasks which are distinctly unique. The shape of the inner core representing the enlarging influence of self demonstrates a gradual developmental change, rather than a step-wise increase with each developmental stage, as development is a gradual progression rather than a staged one. Finally, the surface of the cone is shown as irregular to signify the give-and-take of influence between parents/family, which is the next most intimate level of influence in the Social Ecological Model and self.

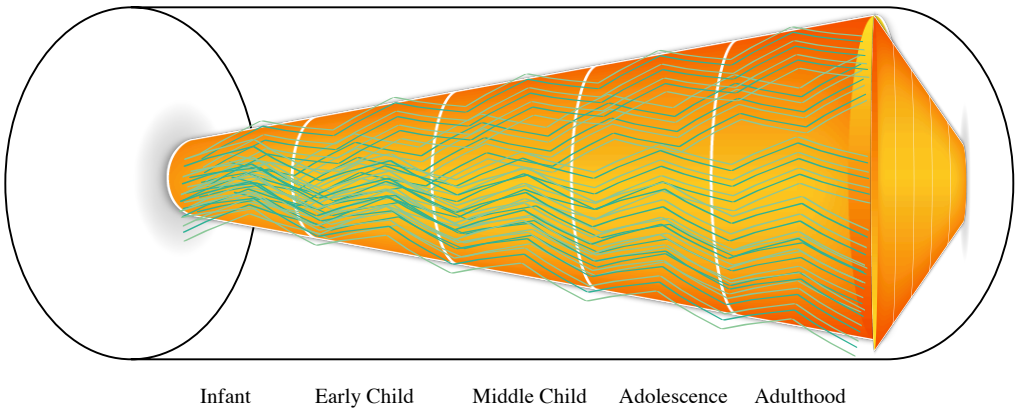

Figure 5.1 Revised Model Unified Theory of Development

IMPLICATIONS FOR PRACTICE

There appear to be several opportunities for pediatric clinical anticipatory guidance, preventive health care, intervention, child advocacy and change in the built environmental.

Pediatric Clinical Anticipatory Guidance

One important function of the well-child visit is anticipatory guidance: the pediatrician anticipates and addresses potential challenges that the parent may face prior to the next well-child visit. It is a valuable one-on-one opportunity to counsel families before an developmental issue presents. Many practitioners use a tool for Health Supervision titled *Bright Future: Guidelines for Health Supervision of Infants, Children, and Adolescents, 3rd Edition (American Academy of Pediatrics, 2011)*. The Bright Futures handbook is a popular practitioner guide published by the American Academy of Pediatrics (AAP, 2011) with reminders concerning objective and subjective data needed and suggested discussion topics for each well child visit. As expected, there are reminders about drug avoidance, exercise promotion, preparation for puberty, immunization updates, school and medical screenings for middle childhood, ages 8, 10 and 12 year olds. Additional guidance would appropriately include a discussion of middle childhood developmental tasks, cautions concerning decreased PA in middle childhood, the value of family PA and parent media monitoring. Parents might be counseled to consider the environment around their home and how it influences child and family PA. For example, families could create a map together of places to be active together and individually and develop a plan for better utilizing the areas around their home for family activity.

Preventive Health Care

Pediatricians work with parents to improve the health of their children, often by helping them access the tools and information necessary to improve their parenting practices. This study highlighted several areas where parents appear to have been the victims of misinformation which resulted in parenting practices that negatively impacted the health and quality of life of their children. Some of these appear amenable to inexpensive educational efforts in clinics, schools and communities.

1) *Media monitoring education for parents of infants*. Parents may be more likely to engage in effective media monitoring if the preventive education occurs before the television sets are placed in the child's bedroom. Parents deserve accurate information concerning the consequences of unlimited media access for young children, as well as the importance of parent monitoring of media usage from infancy through adolescence.

2) *The natural development of independence*. Helping parents understand the natural progression of independence and the importance of parental limits and support throughout child development may help parents establish appropriate boundaries. These topics will require revisiting as developmental stages change and new parenting challenges arise. As the child grows, helpful preventive practice might include encouraging the parent to allow age-appropriate, supervised toddler exploration in a protected environment, parent-accompanied play time at the park in early childhood, and sibling-accompanied play time at the park in middle childhood.

Intervention

Sadly, in pediatric practice, we meet children every day who do not meet the recommendations for daily PA. Perhaps even more disappointing is that rarely does PA become a topic of conversation in the clinic until a diagnosis of obesity or diabetes is

made. However, there is little evidence that prior interventions to treat obesity are successful (Daniels et al., 2005; Foster et al., 2010; NHLBI, 2011). The findings of this study offer several strategies worthy of further consideration and study.

Firstly, the youth were clear to report that they prefer to be outdoors for physical activity. The University of British Columbia and United Way of Lower Mainland British Columbia asked 1266 children ages 9-12 what they wish they were doing after school and 48.7% chose physical activities (Schonert-Reichl et al., 2007). The objective observation revealed that more middle childhood youth utilized programs with supervised outdoor activities after school.

Interventions targeting outdoor activity appropriate for middle childhood development might improve intervention success. This would mean matching their desire to be outdoors and a wish for more physical activity with the opportunity to engage in semi-structured play under the watchful eye of a supportive facilitator. With supervised safe access to PA and gaming equipment, the middle childhood youth will have the freedom to connect with the community and develop valuable physical, social and emotional developmental skills.

Additionally, the youth reported a desire to spend more time in family activity. Interventions targeting the entire family at workplace and park settings may also improve the success of PA interventions. Faith-based communities and neighborhood organizations would also be effective points of organization for family interventions.

Child Advocacy

The findings of this study focus attention on many opportunities to advocate for youth. Unfortunately, there appears to have been media sensationalization of unfortunate circumstances suffered by families whose children have been the victims of horrific

crimes. Parental fear appears to be increasing in the United States and Europe irrespective of SES and neighborhood of residence (Carver et al., 2010; Prezza & Pacilla, 2007; Timperio et al., 2004). While media alerts of missing children are necessary to quickly locate and return abducted children, the coverage of these stories has given parents an inaccurate depiction of juvenile victimization and the relative risk to their child. As a result, parents report an increased fear of stranger danger that does not reflect actual risk and has resulted in parental restriction and decreased childhood PA. This may be corrected with parent, school and community education, and appeals to media outlets.

Additionally, the concordance between youth and objective measures demonstrates the influential relationship between the community and the youth. Therefore, there is a clear need for the community to serve as a supportive environment to the developing youth, offering them a safe place to explore, play, learn and grow, in the absence of the parents. Middle childhood remains that critical time for support and feeling of safety; not only because of the youth's growing need for independence, but also because it is then that the youth's perception of the community is developing. Prezza and Pacilla (2007) reported that 8-10 year olds who were able to move freely in the community were less fearful as adolescents than those who had been restricted in their play as children. Neighborhood watch programs are commonly organized to help neighborhoods protect their property. These watch groups could easily extend to watching the neighborhood to keep the youth safe. For example, the walking school bus programs have been used to encourage active transportation and social connection within the neighborhood (Collins & Kearns, 2005). The walking school bus, however, has been found to be less effective in lower SES communities due to the availability of fewer parent volunteers. All of these examples of community organization help to facilitate

active transportation to and from school, safe independent travel to PA sites, safe walking and bicycling for exercise and safe movement around the community and foster the development of relationships and connectedness that is essential to the middle childhood youth's healthful development.

Change in the Built Environment

Urban areas present many challenges in providing for the needs of all citizens. Innovative solutions are needed to keep pedestrian safe amid high motorized traffic volume and rail transportation. Engineered solutions to pedestrian travel are needed; particularly solutions that slow traffic and protect crosswalks and pedestrians at four-way stops. These efforts are hampered by the fact that different built environmental solutions may be needed for adults and youth. Previous studies have indicated that connected streets increase adult PA by increasing walking to destinations (Klingerman et al., 2007). In contrast, cul-de-sacs, dead-end streets and rural areas increase youth PA by offering areas to play (Humbert et al., 2006). Yet, accessible parks increase usage by families. Perhaps family-centered solutions will benefit a greater number of residents most communities are multigenerational.

FINAL THOUGHTS

A better understanding of PA behaviors in middle childhood may prove helpful in developing strategies for the promotion of PA for health. The benefits of PA are clear, but few want to participate. Despite an expressed desire from middle childhood youth to be more physically active, that opportunity has not been provided. Instead, middle childhood currently signals the beginning of a decrease in PA which continues through adulthood. Hopefully, this exploratory study is the first of many scientific inquiries

which will add to scientific knowledge that promotes lifelong health beginning with a healthful childhood.

Appendix A: Research Instruments

SOPARC

DATE _____ PARK ID # _____ OBSERVER ID # _____ PERIOD: □ Morning □ Lunch □ Afternoon □ Evening
TARGET AREA _____ _____ START TIME _____
Target Area # Subtarget Area #

CONDITIONS OF TARGET AREA

Accessible (e.g., not locked or rented to others) □ Yes □ No
Usable (e.g., is not excessively wet or windy) □ Yes □ No
Equipped (e.g., removable balls available) □ Yes □ No
Supervised (e.g., not locked or rented to others) □ Yes □ No
Organized (e.g., team sporting event) □ Yes □ No

Dark (e.g., insufficiently lit) □ Yes □ No
Empty (i.e., scan area is empty) □ Yes □ No

Comments:

PEOPLE	ACTIVITY	AGE GROUP				ETHNICITY				ACTIVITY LEVEL		
		Child	Teen	Adult	Old	L	B	W	O	S	W	V
Participants	**Primary Activity**											
Female												
Male												
Participants	**Secondary Activity**											
Female												
Male												
Spectators	**Organized Activity**											
Female												
Male												

Codebook of Final Themes and Codes
(modeled after Marshall & Rossman, 2006)

TRAFFIC (Slater et al., 2010)

TR.SPEED: Perceived barrier related to speed/distraction.

TR.SIDEW: Perceived barrier related to sidewalks.

TR.CROSS: Perceived barrier related to street crossing.

TR.RR: Perceived barrier related to railroad and metro tracks.

CRIME (Timperio et al., 2004)

CRFEAR. GEN: Perceived barrier related to general fear of crime

CRFEAR.ABD/SEX: Perceived barrier related to fear of abduction/sexual abuse.

CRFEAR.DRAL: Perceived barrier related to fear of drugs and alcohol.

CR. NEIGHWATCH: Perceived benefit of neighborhood watch.

PARENTAL RESTRICTION (Carver et al., 2010)

PR.CR: Perceived restriction due to perceived crime.

PR.TR: Perceived restriction due to perceived traffic

TECHNOLOGY (Gentile et al., 2010; Rideout et al., 2010)

TECH.TV: Perceived barrier related to television usage.

TECH.VG: Perceived barrier related to videogame usage.

PROGRAMMING (no literature reference)

PROGRAM.$: Perceived barrier related to participation cost.

PROGRAM.ACCESS: Perceived barrier related to availability.

PROGRAM.AGE-APP: Perceived barrier related to age-appropriateness of activity, location and attendees.

ACCESS (Durant et al., 2009; Sallis et al., 2001)

ACCESS.CR: Perceived access barrier due to perceived crime.

ACCESS.TR: Perceived access barrier due to perceived traffic

ACCESS.PR: Perceived access barrier due to parent restriction.

FAMILY INACTIVITY (no literature reference)

FAMILY IA: Perceived barrier due to family inactivity.

Appendix B: Consent Forms

Study 1
Parent Consent Form

INFORMED CONSENT TO PARTICIPATE IN RESEARCH (FOCUS GROUPS)

The University of Texas at Austin

Fit Kids* Fit Families* Fit Communities - Parent and Child focus groups

You and your child ---------- - ----------are invited to participate in a study of children and fitness. My name is Paula Holland Price and I am a pediatrician and doctoral student at The University of Texas at Austin, Department of Kinesiology and Health Education. This study is part of my research involving fitness of school-aged children. Your decision to participate and allow your child to participate in this study will not affect your or your child's current or future relationship with The University of Texas at Austin or The University of Texas Elementary School. If you agree to participate and allow your child to participate, you may discontinue your or your child's participation at any time.

Title of Research Study: ***Fit Kids* Fit Families* Fit Communities***

Principal Investigator(s) (include faculty sponsor), UT affiliation, and Telephone Number(s): Paula Holland Price, M.D., M.S. and John B Bartholomew, Ph.D., Professor, Department of Kinesiology & Health Education; 512-232-6021.

Funding source: The American Academy of Pediatrics CATCH Planning Grant

What is the purpose of this study? The overall goal of the study is to identify the childhood fitness resources in the community, what are the additional fitness needs and how might fitness screening be used to encourage kids to be fit.

Procedure/What will be done if you consent to participate in this research study? You and/or your child will be asked to participate in a brief focus group conversation with approximately 15 other parents at your school's campus, regarding home, school and community family fitness resources and needs. Potential questions include what fitness opportunities are available in the home and the child's school, views concerning resources and needs to encourage childhood fitness, suggestions for increasing childhood fitness and views concerning childhood fitness screening at school. The focus group conversation will be audio taped but no names will be used and tapes will be destroyed once transcribed.

Time: The focus group will be approximately one hour in length.

What are the possible discomforts and risks? The risk associated with this study is no greater than everyday life. There is no anticipated discomfort. If you feel discomfort when asked to answer a particular question, you may refuse to answer the question. If you wish to discuss the information above or any other risks you may experience, you may ask questions now or call the Principal Investigator listed on the front page of this form.

What are the possible benefits to you or to others? There are no direct benefits to either the student or parent/guardian participants. Student participants will receive a free t-shirt for participation. Parent/guardian participants will receive a $10 grocery store gift card. A family meal will be provided and child care and transportation will be available. There are clear potential benefits to society at large. This intervention represents an attempt to increase fitness and prevent obesity, whose effects are reaching epidemic proportions.

If you want to take part in this study, will it cost you anything? Participation in this project is free of charge to all participants.

Will you receive compensation for participation in this study? Student participants will receive a free t-shirt for participation. Parent/guardian participants will receive a $10 grocery store gift card. A family meal will be provided and child care and transportation will be available the evening of the focus group meeting. You will be responsible for any taxes assessed on the compensation. The University has no plan to provide compensation for a physical or psychological injury.

What if you are injured because of the study? No injury is anticipated – focus group conversations will be conducted within the school in the regular school setting (office/conference room). The University has no program or plan to provide treatment for research related injury or payment in the event of a medical problem. In the event of a research related injury, please contact the principal investigator.

If you do not want to take part in this study, what other options are available? Your participation in this study is entirely voluntary. You are free to refuse to be in the study, and your refusal will not influence current or future relationships with The University of Texas at Austin or The University of Texas Elementary School.

How can you withdraw from this research study and whom should you call if you have questions? If you wish to withdraw from this study at any time or if you have any questions at any time, you should contact the principal investigator, Paula Holland Price, M.D., M.S. at 512-232-6054. You should also call the principal investigator for any questions, concerns, or complaints about the research. You are free to withdraw your

consent and stop participation in this research study at any time without penalty or loss of benefits for which you may be entitled. Throughout the study, the researchers will notify you of new information that may become available and that might affect your decision to remain in the study. In addition, if you have questions about your rights as a research participant, or if you have complaints, concerns, or questions about the research, please contact The University of Texas at Austin Institutional Review Board for the Protection of Human Subjects, or the Office of Research Compliance and Support at (512) 471-8871.

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. Your responses will not be linked to your name or your name in any written or verbal report of this research project.

How will the privacy and the confidentiality of your research records be protected?

Focus group conversations will be audio taped. Tapes will be coded so that no personally identifying information is visible on them. The tapes will be heard for research purposes only and will be destroyed after they are transcribed. All identifying information will be removed from all data sheets. These sheets will be stored in a locked file cabinet within Dr. Price's office at the University of Texas at Austin. In addition, no identifying information will be entered into the data file. Instead, participant data will be filed under a random identification number, which will also be used on all electronic data. A master list of participant names and their identification number will be created. This will be maintained in a separate, locked office, along with the keys to the file cabinets containing the stored data in the lab.

You may keep the copy of this consent form.

This study is supported by The American Academy of Pediatrics CATCH funding and this sponsor will have a legal right to review your research records.

If in the unlikely event it becomes necessary for the Institutional Review Board to review your research records, then the University of Texas at Austin will protect the confidentiality of those records to the extent permitted by law. The research records will not be released without your consent unless required by law or a court order. The data resulting from your participation may be made available to other researchers in the future for research purposes not detailed within this consent form. In these cases, the data will contain no identifying information that could associate you with it, or with your participation in any study.

If the results of this research are published or presented at scientific meetings, your identity will not be disclosed.

Will the researchers benefit from your participation in this study? At the end of this project, the researchers will discover possible childhood fitness needs in the community and possible methods to encourage and assess fitness in children.

Signatures:
You are making a decision about participating in this study. Your signature below indicates that you have read the information provided above and have decided to participate in the study and to allow your child to participate in the study. If you later decide that you wish to withdraw from the study, simply tell me. You may discontinue participation at any time.

I grant consent to participate in this study:

☐ **YES** **NO** ☐

_____

Printed Name of Parent or Legal Guardian **Date**

_____

Printed Name of child **Date**

_____

Signature of Parent or Legal Guardian **Date**

_____

Signature of Investigator **Date**

Child Assent

Assent Form (student focus group)

Fit Kids*Fit Families*Fit Communities

I agree to be in a study about fitness. This study was explained to my parent/guardian and she/he said that I could be in it. The only people who will know about what I say and do in the study will be the people in charge of the study.

In the study I will be asked questions about where and how I play and get exercise at home and at school. I will also be asked about my ideas to help kids be more active and play more.

Writing my name on this page means the page was read by me or to me and that I agree to be in the study. I know what will happen to me. If I decide to quit the study, all I have to do is tell the person in charge.

Child's signature Date

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